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ANNUAL TAPPI ISSUE

# Paper TRADE JOURNAL

VOLUME 127, NO. 21 NOVEMBER 18, 1948

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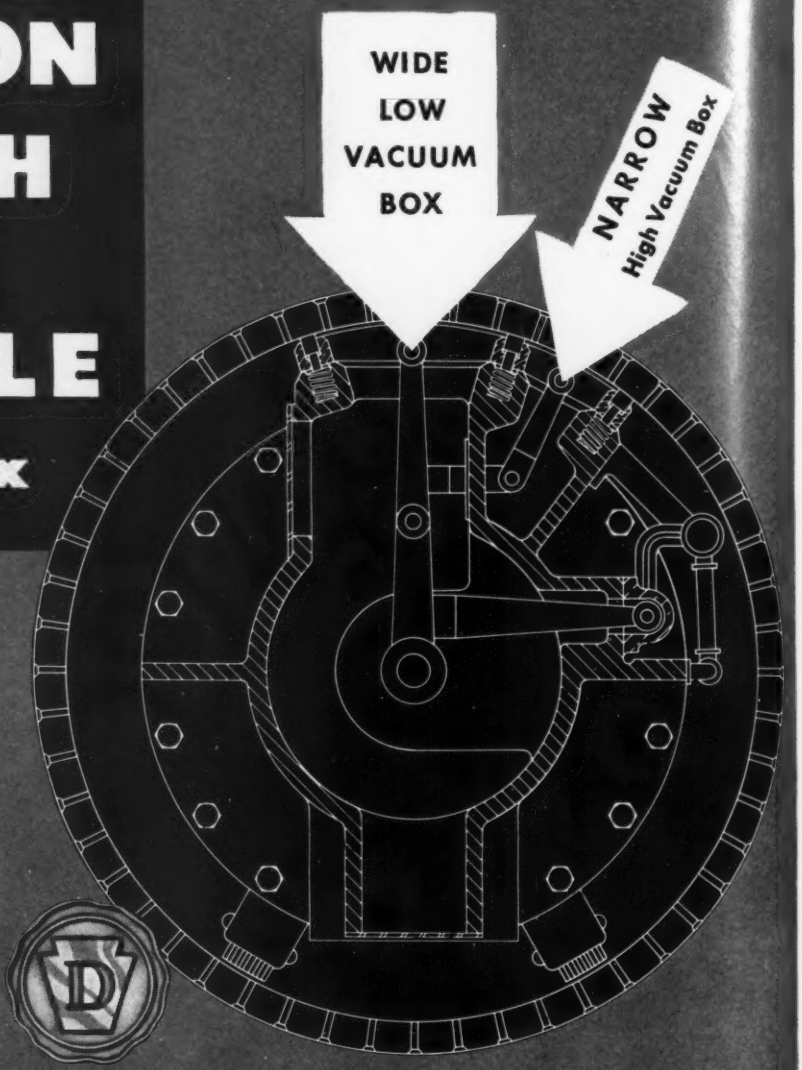


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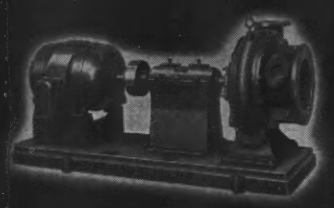
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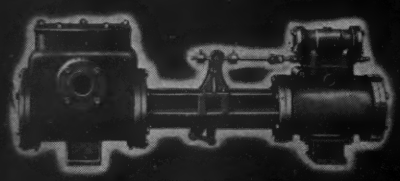
Type 5-SOD-15. . . 12" suction nozzle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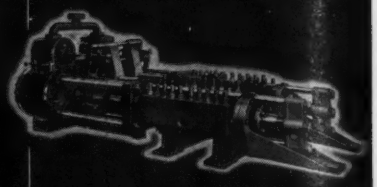
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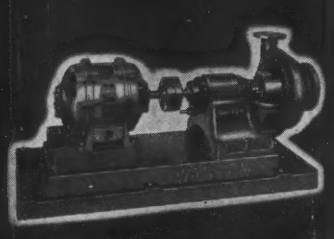
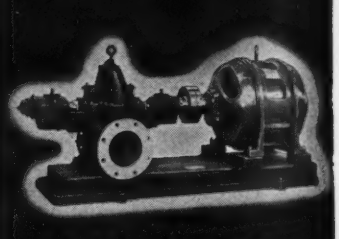
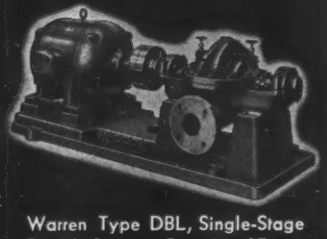
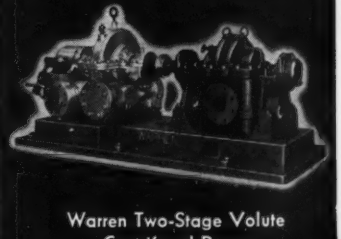
P 14


Warren Type "L" Single-Stage
Single-Suction Liquor Pump


Warren Double Suction Pump
Single Stage


Warren Type DBL, Single-Stage
Double Suction, Centrifugal Pump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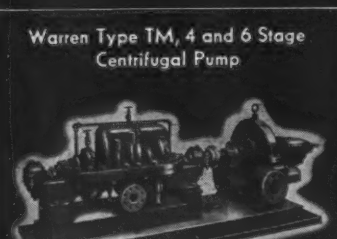
Warren Type TM, 4 and 6 Stage
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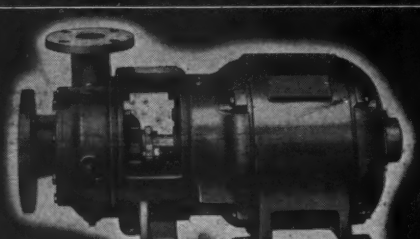
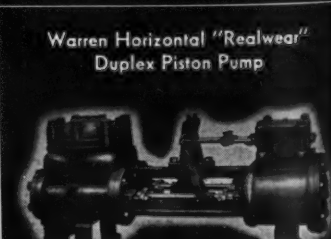

Warren "Compacunit"—4 Types—42 Sizes


Warren Horizontal "Realwear"
Duplex Piston Pump

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# International Paper Company's Board Chairman

# Richard J. Cullen Dies at 73

*Richard J. Cullen,* 73, chairman of the board of the International Paper Co., New York City, since 1943, died in St. Joseph's Hospital, Phoenix, Ariz., on November 13. He had undergone an emergency operation on November 10 for a ruptured appendix.

From the outset of his career, Mr. Cullen was associated with the paper industry, and did much to further its development in the South, being one of the first to open up the vast resources of southern woodlands as the raw material for making kraft paper. Later, Mr. Cullen again pushed back the technological frontier in the South by recognizing the commercial possibilities of mass-producing kraft container board on Fourdrinier machines. For the last 30 years he was one of the major figures responsible for the development of an industry of incalculable value to the social and economic well-being of the South.

A native of Toronto, Mr. Cullen, as a young mechanical engineer, was employed in the engineering department of the Riordon Paper Mills, Ltd., the properties of which are now part of Canadian International Paper Co.

His first assignment was in connection with the reconstruction of the Riordon pulp mill at Merritton, Ont., near Niagara Falls, and he later designed and supervised the construction of the Riordon Mill at Hawkesbury, Ont. In 1909 he came to the United States as manager of the Cushnoc Paper Co. in Augusta, Maine.

Some years later, Mr. Cullen became interested in the possibility of manufacturing kraft pulp and paper in the Southern states. The first kraft paper mill in the South has been built at Orange, Texas, in 1910, but the important development in kraft paper did not come until the 1920's.

In 1918, Mr. Cullen became vice-president and general manager of the Louisiana Fibreboard Co. of Bogalusa. He remodeled the mill which was later sold to the Great Southern Lumber Co.

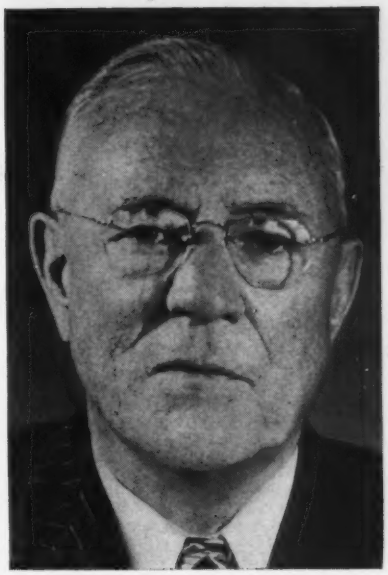
He designed the plant of the Century Roofing Co. of New Orleans and later negotiated a consolidation of this company with the Richardson Paper Co. of Lockland, Ohio.

In 1920, Mr. Cullen designed and built the Bastrop Pulp & Paper Co. mill at Bastrop, La., for the manufacture of kraft pulp and paper. As soon as this mill began operating, he designed and built the Louisiana Pulp & Paper Co. mill, also in Bastrop.

Bastrop and Louisiana Mills operated independently until 1925, when International purchased the Bastrop mill. Two years later International acquired the Louisiana Pulp & Paper Co. Mill, and at that time Mr. Cullen joined the International family as president of Southern International Paper Co. Later he became president of its successor, the Southern Kraft Corp. He was elected vice-president of International Paper in 1927 and continued in direct charge of Southern Kraft operations until 1935, when he was appointed manager of manufacture of all International Paper Co. mills.

In 1927, under Mr. Cullen's direction, the company began construction of the mill at Camden, Ark., the first Southern Kraft Mill built by International, which was completed early in 1928. Also, in 1928, the Moss Point, Miss., mill, originally constructed in 1912, was acquired and remodelled by the company. In 1929, under Mr. Cullen's supervision, the company built the Mobile, Ala., mill which began production of various grades of kraft paper the same year.

During the late 1920's Mr. Cullen had become interested in the vast possibilities of mass-producing an all-kraft board for shipping containers on Fourdrinier paper machines. Board of this type had been produced experimentally and to a limited extent commercially during the 1920's, but large-scale commercial production began in March, 1931, when International's Panama City, Florida, mill, built during 1929 and 1930, started operations. The Panama City mill, designed by Mr. Cullen, was the first kraft mill to be devoted exclusively to container board production. Its present capacity is 900 tons per day.



RICHARD J. CULLEN

In 1937 the company built another large container board mill at Georgetown, S. C. In 1942 it was enlarged to become the largest paper mill in the world, with a capacity of 1,350 tons of board per day. In 1938, the company completed construction of the Springhill, La., mill which, with subsequent additions, has a daily capacity of 780 tons of kraft container board and 230 tons of fine grades of bleached kraft paper and board.

Mr. Cullen became a director of International Paper Co. in January, 1936, and a few weeks later was elected president. In 1943 he was elected chairman of the Corporation and was succeeded as president by John H. Hinman.

Mr. Cullen had passed the winters in Phoenix for the last 22 years and recently had come to consider it his permanent home. He is survived by his second wife, Mrs. Eleanor Campbell Cullen. His first wife, Mrs. Julia Schaupp Cullen, died in New York in 1946.

World's largest electric motor and control manufacturing plant—floor area, 2,238,000 square feet.

# Westinghouse Shows TAPPI Its Buffalo Plant

## 350 Members On All-Day Sight-Seeing Tour

When members of the TAPPI Engineering Conference were guests of the Westinghouse Electric Corp., in Buffalo, N. Y., on October 26, they inspected the world's largest electric motor and control plant. The plant, which is adjacent to the Municipal Airport, is on a 151-acre tract and the buildings have a floor area of 2,238,000 square feet.

The main manufacturing building, a one-story structure, is 2,010 feet long and 600 feet wide, with a partial basement. It contains 1,860,000 square feet of floor-space under one roof. An office building 400 feet long by 50 feet wide and an engineering building 900 feet long by 100 feet wide, each having a basement, first and second floors, are directly connected to the front of the manufacturing building.

The buildings were specifically designed for mass production, with open floor-area free from columns, allowing straight-line flow of production from raw stock to finished product. Column spacing ranges from 50 feet by 100 feet to 200 feet by 200 feet, with one area having a clear span of 235 feet by 600 feet, facilitating the ideal placement of machinery.

While insofar as possible, all of the manufacturing methods in this plant have been reduced to an assembly line basis, a considerable amount of highly skilled handwork is still required in such operations as wiring controls. Seven thousand workers are employed in this plant.

The plant has a rating among the highest in the amount of equipment installed for controlling working conditions which normally reflect the productive efficiency of employes.

The term "controlled conditions" is effectively descriptive, for temperature, humidity, sound and light are all controlled, with emphasis on convenience, comfort of the employes, speed and economy of operation.

A parking area with facilities for 5,000 cars is located north of the main building. Brightly lighted basement tunnels connect the parking area with various sections of the main building, thus allowing workers to enter and leave without being exposed to the weather.

The plant is equipped with washrooms, locker rooms, a hospital containing X-ray and operating rooms and a cafeteria which accommodates 1,500 persons at one sitting. The hospital and cafeteria, and many of the offices, are now air-conditioned. Eventually the entire plant will be air-conditioned.

Ten miles of railroad track on the property connect with the main lines of two major railroads. Sidings and loading platforms inside the main building, permit all-weather loading.

Electric power is supplied by one 33-kv and one 115-kv line; transformed to 4,800-v at outdoor substation; distributed through underground ducts to 750-kva power centers and 500-kva lighting centers; re-distributed at 440-v to motors through bus-duct and at 208-120-v to lighting through conduit; 33,000-40 watt fluorescent lamps in low bay area, and 11,000-85 watt RF fluorescent lamps in high bay provide 30 foot-candles to work surface. Esti-

**A. M. COOPER**
**Manager, Industrial Sales General Mill Electrification**
**—shows control units being built for Weyerhaeuser Timber Co.**

mated total load is 11,000-kv.

Originally designed as a black-out plant, fluorescent lighting of 30-foot candles replaces or augments the shifting light of day. Midnight is the same as midday. Exhaust fans draw off foul air, smoke and dust, which is displaced with clean, humidified air. Drinking fountains, generously distributed throughout the plant, supply cool, pure water.

In addition to electric motors and generators, industrial controls, copper and wire products, arc and spot welders and rectifiers are manufactured in the plant.

The electric motors built here are of the entirely new "Lifeline" type. The frames are of steel instead of cast iron and the bearings are anti-friction, with sealed-in lubrication for five years of operation. These motors are lighter in weight, stronger and more durable than the old-style Westinghouse motors. Experience indicates that frequency of troubles and breakdowns is only ten to 20 percent of that encountered with the old style motors.

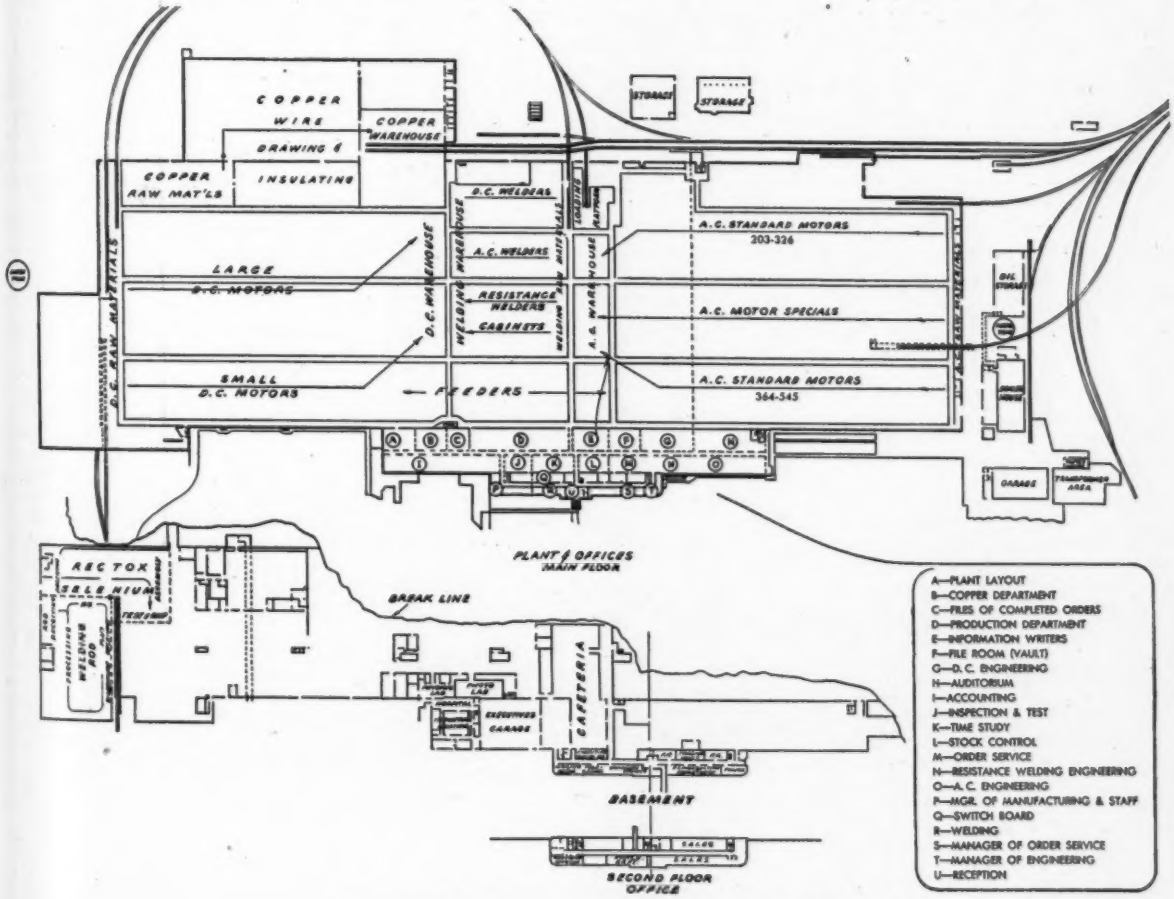
In most of the new Lifeline motors the frames, feet and end brackets are made of steel, although in some types of motors and generators some or all of these parts may be of cast iron. The steel parts may be rolled, stamped or forged. The cylindrical part of the frame is rolled from a flat plate, the ends being then joined by a weld similar to thermite welding. The frame is then permanently welded to the feet. The end brackets are bolted to the frame after the wiring, rotor, etc., have been installed.

An interesting part of the plant is the copper wire division, where rough stock about one-half inch in diameter is drawn down to wires of smaller diameters. This is accomplished by pulling the wire through a series of dies, each of which reduces the diameter of the wire by stretching it lengthwise. Since only a small reduction in diameter may be obtained with each die, a large number is required to produce the smaller sizes of wires. Some of the machines have as many as 15 dies. All of these machines operate at high speed and their production rate is excellent.

Another activity in this division is the application of enamel or varnish insulation to the surface of the wires. The wire is run through a bath of the coating solution, usually a phenolic type of thermosetting varnish. The wire then travels through long vertical heating chambers where the resin is set and the solvent evaporated, after which the finished wire is rewound on spools of various sizes.

**L. R. LUDWIG**

**Manager, Buffalo Division, Westinghouse Electric Corp. —extended official welcome to visiting TAPPI engineers.**




**Ground plan, Westinghouse Electric Corp., plant, Buffalo, N. Y.**

# How Users Appraise the Paper Markets

***Report released Nov. 10 by Paper Committee, National Ass'n., Purchasing Agents, under supervision of Chairman T. A. Corcoran, Courier-Journal and Louisville Times Co., Louisville, Ky.***

On the surface, there seems to have been little change in the paper market since the last report. Underneath, however, there are changes taking place. Most grades are becoming easier in supply. Prices per pound or ton are not declining—in fact, one prominent newsprint producer put in an increase of $4.00 per ton on November 1—but the actual cost of paper *is* coming down. The section on Fine Papers points out that inspection, finish and packing are receiving much more attention now. As a result, the user is getting better quality and his actual paper cost for a given job is less than it was a year ago.

The report points out, too, that a printer, who wants a No. 4 sulphite sheet for a specific job, can get it now, and doesn't have to take a No. 1 grade, at its higher price. This also results in an actual reduction in paper cost.

The production ratio report for September indicates that only 91.8% of capacity was used by all U. S. paper and paperboard manufacturers, compared with 102% in September, 1947. Due to increased producing capacity, however, the actual production in tons is greater this year. The figures indicate that additional supply will be available when and if it is needed.

## Kraft Paper

By T. H. TREADWELL
*W. C. Ritchie & Co.*
*Chicago, Ill.*

There has been no marked change in supply or price of kraft paper since our last report. Jobbers and large users are still on allotment. We foresee no decided improvement in the immediate future.

## Wood Pulp

By H. L. WEBER
*Fiberboard Products, Inc.*
*San Francisco, Calif.*

Trying to report on the pulp situation at this time is like trying to cross a busy street against the traffic lights—it's confusing.

Right now, with the possible exception of bleached grades, there is very definitely an adequate supply of pulp, and prices, as usually happens when supply exceeds demand, are doing what comes naturally. The buyers, faced with these two conditions, are pretty well holding out of the market pending clarification of the whole picture.

Underlying all this, however, seems to be a feeling that this situation could partially correct itself, come the first quarter of next year, and what is going to happen then will depend on the business picture at that time.

## Boxboard

By STUART EDGERTON
*United States Rubber Co.*
*New York City*

A buyers' market seems to be developing, and the question of who pays the freight, the eliminations of certain differentials and more active competition in the base price, are matters which the buyer should watch carefully in placing his orders for various grades of boxboard.

Raw materials required in the manufacture of boxboard are reported to be in good supply. The quality of the finished product continues to be improved by most boxboard mills. Deliveries of board are readily available.

## Paper Containers

By LEE R. FORKER
*Quaker Stock Oil Ref'g Corp.*
*Oil City, Pa.*

As paper container purchasing agents know, it is possible to secure improved quality of paper shipping containers without delay and at no increase in cost compared with several months ago; so, although the unit price has not changed, there definitely is an improvement in quality.

It is our prediction that, if the volume of demand decreases, price shading may materialize very quickly, due to the huge production of raw material for paper containers and the competition of the various converters and manufacturers.

## Newsprint

By T. A. CORCORAN

*Consumption* of newsprint in the United States continues at an all-time high, currently running about 11% ahead of 1947, the previous record year. September consumption of 440,779 tons was 10.3% above the same month a year ago.

*Supply* available to U. S. users in September amounted to 432,191 tons, an increase of 4.6% over September, 1947. Nine months supply adds up to 3,844,020, up 7.6% over the same period of last year.

Total North American *stocks* dropped 32,853 tons during September and stood at 692,050 tons at the end of the month. The 525 daily newspapers reporting to the American Newspaper Publishers' Association had 42 days' supply at the end of September, compared with 45 days' a month earlier, and 39 days' on the same date a year ago.

The largest U. S. producer raised its price $4.00 per ton, to bring it in line with the average Canadian price of $100.00 per ton, delivered at New York City. So far, there has been no indication of a further increase, at this time, by the Canadian producers. Some domestic mills, with contract prices based on averages of other mills, will have automatic increases.

## Fine Papers

By E. E. McCULLEY
*Courier-Journal Job Printing Co.*
*Louisville, Ky.*

The rag grades of fine paper continue to improve in quality. Inspection, finish and packing are receiving deserved and needed attention, and the market is such that buyers' specifications receive close attention. Large investments in high speed presses have been made by many printers and lithographers and, unless papers can be made available to perform at these higher speeds with minimum spoilage, the producer has little chance to share in the volume rag market.

Important tonnage in the volume class is moving at prices currently satisfactory to both buyer and seller and, with ample tonnage available in the market, it is not expected that unrealistic pricing will be permitted to interfere with the necessity of both buyer and seller to keep the 25% rag grade, at least, moving along in reasonable volume.

The sulphites continue in ample supply and there are signs that pressure on prices is being felt more keenly. A year ago, No. 4 sulphite was a scarce article and the major portion of sulphite shipments were in the No. 1 grade. That situation is being rapidly reversed. As the total of annual mill shipments change from No. 1 sulphite in excess to No. 4 sulphite in excess, annual sales drop by the differential between No. 1 and No. 4. The No. 1 sulphite market was artificially expanded and the No. 4 sulphite market reduced, for the simple reason that mills could sell all of their production in the higher priced No. 1 grade.

Since an increasing amount of annual production is being marketed in the lower priced No. 4 grade, the producing mills have felt the same effect

as though a price reduction had taken place—as a matter of fact, a price cut has been sustained by the industry. To the user of paper, downgrading is equivalent to a price cut, in the same sense that upgrading represented a price increase, as many so well remember, when we were being upgraded, de-quota-ed and escalated all at once.

The buyer no longer has to enter the market places feeling like David and his sling shot keeping a date with Goliath. The offensive and defensive equipment of both buyer and seller are about equally divided today and neither feels that he is being matched out of his class.

### West Coast Conditions

By HORACE DUCKENFIELD
*Metropolitan Life Insurance Co.*
*San Francisco, Calif.*

In the opinion of the majority of paper dealers in Northern California, the situation is static. In fact, the report for this month could well be an almost verbatim repetition of last month's report. There is no indication that the picture in the paper industry has changed, from any viewpoint, during the last 30 days.

Demand is light, due partially to the shipping strike, and somewhat attributable to the usual unsettled conditions prior to a national election.

Virtually all grades of paper, perhaps with the one exception of tissues, are in good supply and it is felt that, with the advent of 1949, there should be a marked improvement in West Coast business.

### Canadian Conditions

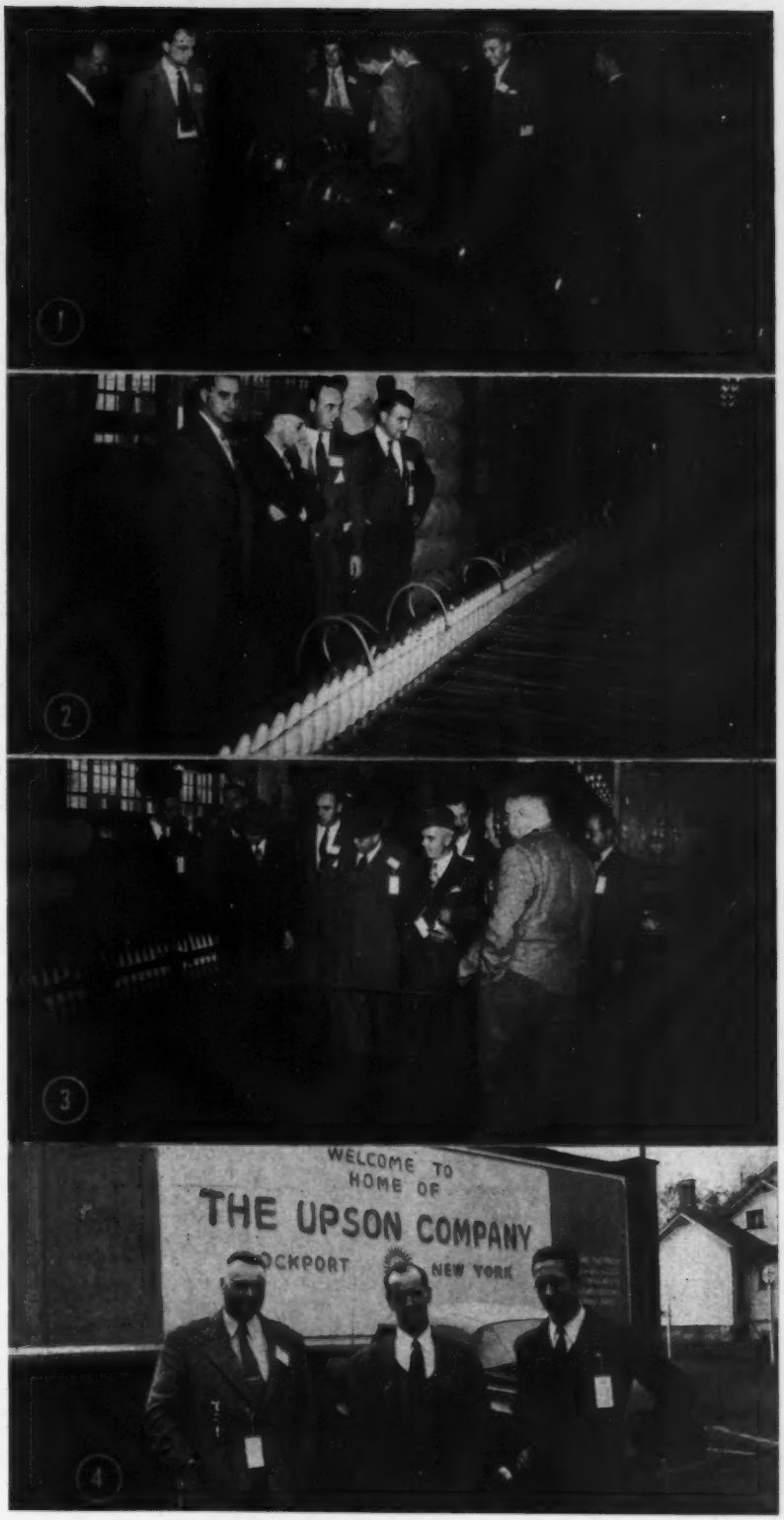
By J. F. STEPHENSON
*Kraft Containers, Ltd.*
*Hamilton, Canada*

The fine paper situation is very good, and it is possible to secure a more varied selection of paper. Many of the former grades of paper—20 lb. basis bond, 80 lb. basis super calendered stock, and heavier weights of book paper—are available. Quotas are still on, but, as reported previously, mean very little, as stocks seem to be fairly good. Delivery is improving.

The newsprint mills are still running at full speed, with demand still being slightly in excess of supply. How long this position may last is anyone's guess, but there appears to be a feeling that conditions will be better by the end of the year, unless war should come again.

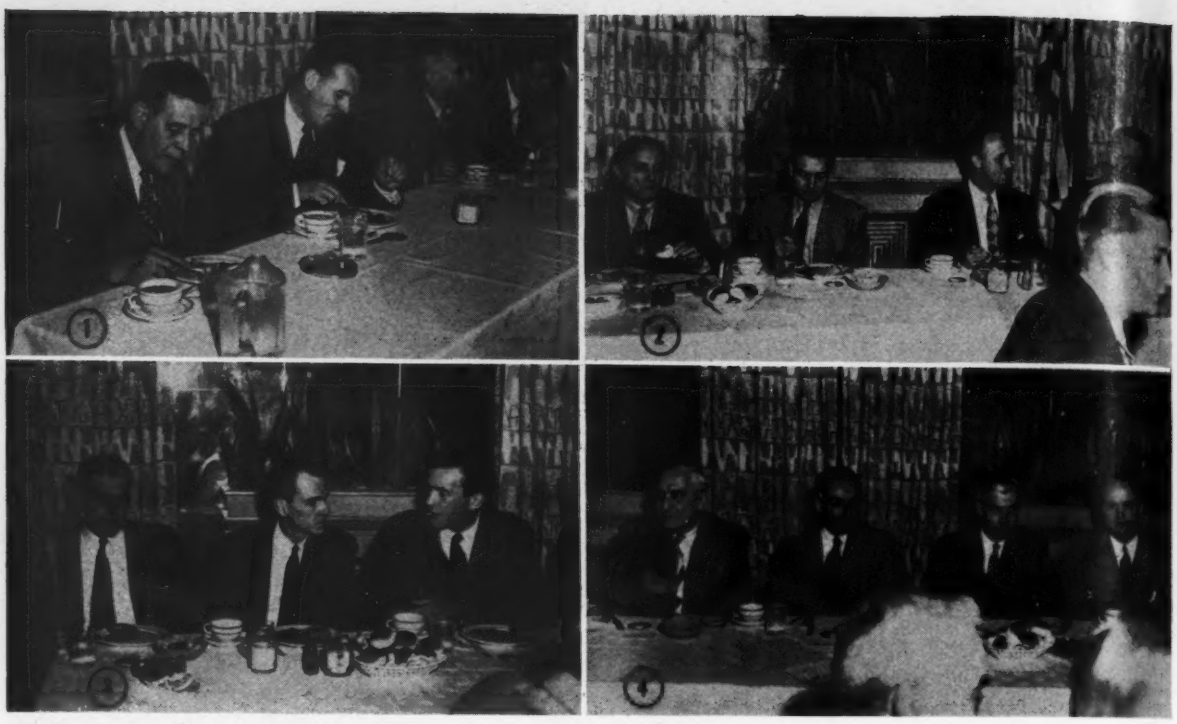
Certain grades of kraft paper have advanced 10% in price, with supply being fairly plentiful. It would be wise, however, to keep a good inventory, in case the mills catch up and seek other outlets for their material and be unable to supply us should our demand exceed present day requirements.

Paper, in general, shows a vast improvement over the past few months and should it continue, there may be a lull in this industry by next Spring.




## TAPPI MEN ON PLANT TOURS

**(1) TAPPI visitors see motors in production at the Westinghouse plant in Buffalo on October 26; (2) (3) TAPPI visitors see felts in the making at the Lockport Felt Co., plant on October 28; (4) Henry W. Downs of the Union Screen Plate Co., of Canada; Irving Earl, technical director of the Upson Co.; and R. T. Bingham of TAPPI, during the TAPPI Engineering Conference, visit the Upson Co., plant on October 28.**



(1) Left to right: Glen Sutton, Sutherland Paper Co.; R. E. Walters, Pulp & Paper; O. F. Flatland, Eddy Paper Corp.; Frank R. Hamilton, Allied Paper Mills. (2) Left to right: O. F. Flatland, Eddy Paper Corp.; Frank R. Hamilton, Allied Paper Mills; Robert H. Pete, Peroxygen Products Development, E. I. du Pont de Nemours & Co., Inc.; J. H. Heuer, St. Regis Paper Co. (3) Left to right: William F. Hathaway, Kalamazoo Vegetable Parchment Co.; Fred R. Sheldon, Buffalo Electro-Chemical Co., Inc.; James A. Wise, Kalamazoo Paper Co. (4) Left to right: Arthur W. Cole, Rex Paper Co.; Ray L. Barton, Michigan Paper Co.; William H. Astle, Michigan Paper Co.; O. W. Callighan, Edgar Bros. Co.

# De-Inking—Michigan Superintendents' Subject

KALAMAZOO—The Michigan Division of the American Pulp and Paper Mill Superintendents Association, Inc., October meeting at the Hotel Harris, the evening of October 21, registered an attendance of 177 members and guests. In the absence of the division chairman, Herb Johnston, W. B. Hathaway presided at the meeting.

Several guests were introduced and announcements were made at the opening of the meeting. Among the guests introduced were Fred Goodwill, recently appointed manager of the Bryant Division of the St. Regis Paper Co. and H. D. Wolfe, formerly with Weyerhaeuser Timber Co.

Division Secretary, Olin W. Callighan gave a brief report on his recent trip to the West Coast. Then he introduced J. H. Heuer, recently appointed technical director of the Deferiet, N. Y., mill of the St. Regis Paper Co., as the speaker of the evening. Mr. Heuer's subject was "De-inking Waste Papers with Sodium Peroxide." Following the presentation of his formal paper, Mr. Heuer described a de-inking unit of his design with the help of a detailed drawing that was thrown on the screen.

Mr. Heuer then acted as moderator of a panel session on the subject of his paper. Members of the panel included Robert H. Pete of Dupont's Peroxygen Products Division, Niagara Falls, N. Y., and Fred R. Sheldon of the Electro-Chemical Co., Buffalo, N. Y., and the following mill superintendents:

A. W. Cole, Rex Paper Co.; Raymond L. Barton, Michigan Paper Co.; Louis J. Scheid, Watervliet Paper Co.; James A. Wise, Kalamazoo Paper Co.; M. J. Killian, Bryant Division of St. Regis Paper Co.; O. F. Flatland, Eddy Paper Co.; and Frank R. Hamilton, Allied Paper Mills.

This general question-and-answer period lasted nearly two hours. Special attention was given the troubles met by board mill men in the balling of saponified ink on screens in the de-inking process and of means to prevent it. Mr. Heuer mentioned the need for improved processes in recovering waste paper due to the increased demand of mills for this raw product because of the high price of pulp. He discussed the growing use of hydrogen and sodium peroxides in place of soda ash because of the increased groundwood content of publication papers. These papers, he said, now run as high as 50 percent groundwood.

Through the courtesy of Kenneth McClelland of J. E. Rhoads & Sons, a record of the entire discussion was made on a Sound-Scriber for later transcriptions for those who are interested.

Among those in attendance were:

Amberg, R. J., Johns Manville Corp.; Astle, Wm. H., Michigan Paper Co.; Atkins, Ralph, Lee Paper Co.

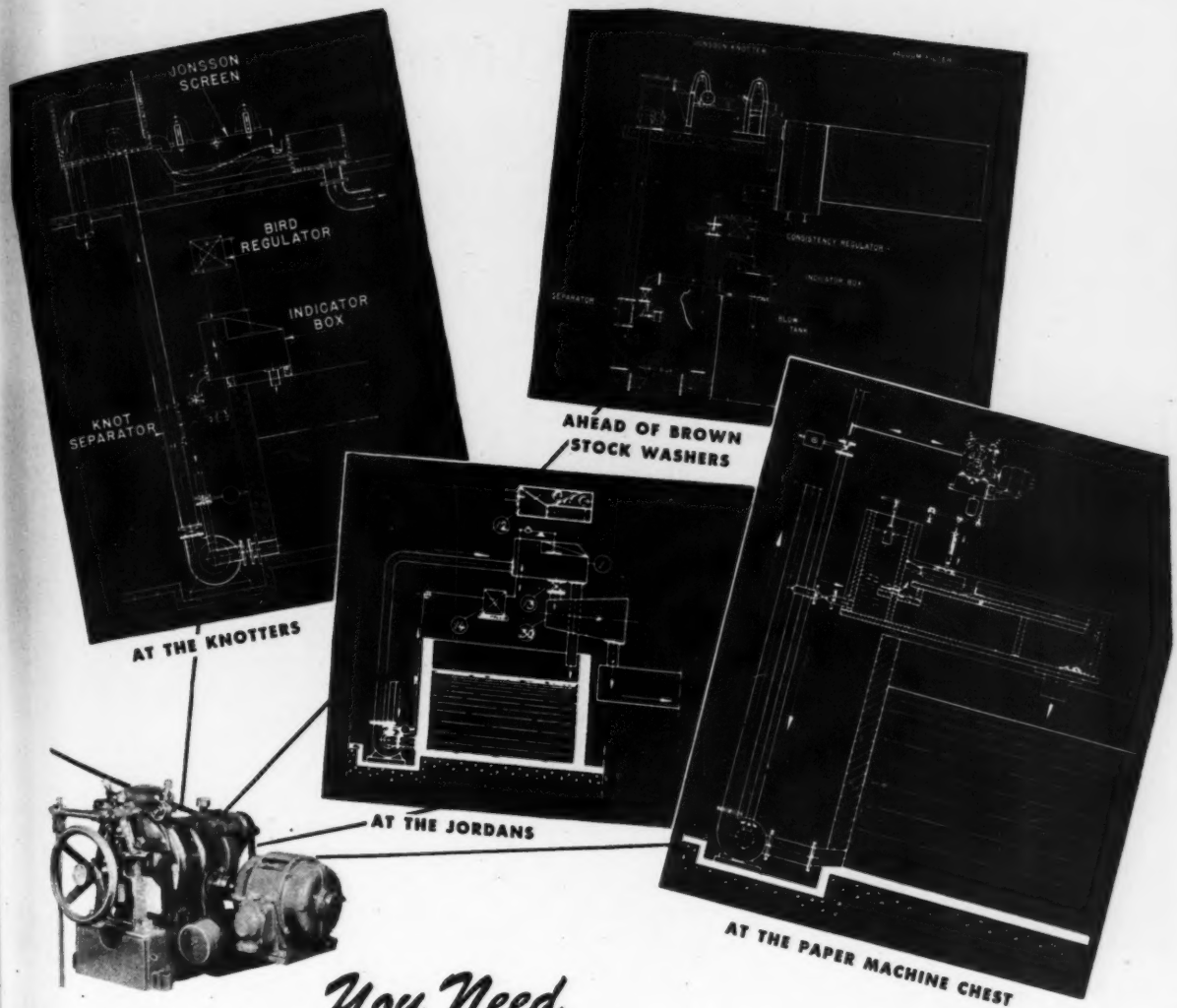
Baker, Don, St. Regis Paper Co.; Borden, D. A., Otsego Falls Paper Mills; Barton, Ray, Michigan Paper Co.; Beveridge, R. C.; Beverly, W. M., Briston Co.; Bowden, Arthur, Bailey Greoda Co.; Bradford, Harry C., Rex Paper Co.; Breyfogle, L. H., Draper Brothers Co.; Buenger Jr., M., St. Regis Paper Co.; Burchfield, Paul E., Wyandotte Chemical Corp.; Burstein, Vic, Michigan Paper Co.;

Callighan, Olin W., Edgar Bros. Co., Carrell, W. M., Allied Paper Mills; Carey, R., American Coating Mills; Cole, A. W., Rex Paper Co.; Cottrell, S. V., National Aniline Div.

Deamer, P. F.; Dean, J. A., Michigan Paper Co.; Dow, John W., Shartle Bros. Machine Co.; Dunton, E. A., French Paper Co.

Eick, George H., National Southern Products, Eilers, Frank B., Orr Felt & Blanket Co., Eastwood Nealley Corp.; Erickson, D. Robert, graphic arts research; Faram, H. S., Watervliet Paper Co.; Fisher, Harry C., Gardner-Richardson Co.; Flatland, L. F., Eddy Paper Co.; Flotow, M. F., Central Paper Corp.; Fogerty, M. S., Sutherland Paper Co.; Fox, F., Rocky River Paper Mills, Inc.; French, Ed., French Paper Co.; Fritz, James H., Nopco Chemical Co.

*(Continued on page 88)*

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**The Bird Regulator handles all kinds of stock, free or slow. It maintains consistency at never more than 0.1% heavier or lighter than desired, whether less than 1% or as heavy as a pump will take. You just set it and forget it.**

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# American Institute of Chemical Engineers

NEW YORK—More than 1,850 chemical engineers assembled at Hotel Pennsylvania, November 8-10, for a three-day meeting of the American Institute of Chemical Engineers on such diverse subjects as blowing bubbles, figuring where the chemical plants of the future should be located, and learning how to design better and cheaper towers than those which now dominate the chemical and oil refinery skyline.

FRANCIS J. CURTIS
Incoming Institute President

DR. ALLAN PHILIP COLBURN
Retiring Institute President

The first day was highlighted by symposiums on the efficiency of distilling columns and on designing instrument systems for plants so that they will operate around the clock at top efficiency.

On November 9 there was a group of talks on the location of chemical plants. Such diverse factors as dispersing plants for protection against atomic bombing, water supplies, and American mineral resources were discussed. The chemical engineers also heard the particular problems of some specific industries, such as plastics manufacturing and production of chemicals from agricultural products.

On November 10 there was a symposium on drying of materials. Various types of drying were covered, including spray drying — the method which produces the very fine powdered soap powders in the newest type of kitchen washing aids—and high vacuum drying —used extensively in the production of penicillin, streptomycin, and others of the new antibiotics.

Dr. Albert E. Newman, professor of chemical engineering at City College of New York, retiring president of the American Institute of Chemical Engineers, presided at the main dinner on November 8. Principal speaker of the evening was J. V. N. Dorr, president of the Dorr Co., New York.

### The New President

Francis J. Curtis, vice-president and secretary of the Executive Committee of the Monsanto Chemical Co., St. Louis, was elected president of the Institute. Serving with him, in the office of vice-president, will be Dr. Warren Lee McCabe, former head of the chemical engineering department at Carnegie Institute of Technology, and now director of research of the Flintkote Corp.

The chemical engineers also elected as directors: H. D. Wilde, manager of the technical and research division, Humble Oil & Refining. Co., Houston, Tex.; Paul D. V. Manning, director of research of the International Mineral & Chemical Corp., Chicago; Donald B. Keyes, vice-president of the Heyden Chemical Corp., New York City; and Irvin L. Murray, assistant superintendent of engineering of the Carbide & Carbon Chemicals Corp., South Charleston, W. Va.

### Professional Progress Award

The rapid growth of science and its extensive application by engineering have brought the forces of nature so greatly under the control of man that we appear to be on the threshold of "One World" without being prepared for the human relationships, Dr. Allan P. Colburn, 1948 winner of the Professional Progress Award in Chemical Engineering, sponsored by the Celanese Corp. of America, declared at the November 8 meeting.

In addition to the responsibility engineers have for helping create this unstable condition, Dr. Colburn said, they have a proved method of approach which might well contribute to the working out of some of these problems.

"Shouldn't it be worthwhile to explore," the speaker asked, "whether and how far the engineering approach might be utilized in the field of human and international relations in order to make definite accomplishments? I specifically have in mind two fields for such an engineering type of action, first the principles for an effective cooperation between nations, and second, their application to a world government as far as it is indispensable to maintain world peace."

Dr. Colburn was announced as the first winner of the award which was established last year by Celanese to give recognition to the efforts of the younger men in the chemical profession. One of the provisions is that it go to a man not yet 45 years of age. The American Institute of Chemical Engineers is charged with the administration of the award. At present, Dr. Colburn is assistant to the president of the University of Delaware.

## World Wood Shortage

WASHINGTON—Demand for forest products has been unfulfilled since World War II, with the world apparently headed for a chronic wood shortage, the United Nations' Food and Agricultural Organization reports.

"Deterioration of forests continues at a rapid rate and replacement cannot keep up with cuttings," the survey states. "However, in spite of stated requirements at high figures, many countries cannot use even available supplies because of lack of foreign exchange."

Growing industrial utilization of wood was cited as one major cause of the situation. Acute shortages of some wood commodities exist now, the agency continued.

Among its recommendations are amendment of existing forest legislation toward more stringent regulation, which already is seen in some nations, and long-range plans for development and utilization of wood resources.

## Four Grays Urged

NEW YORK—Four shades of gray for use in painting industrial machinery and equipment are recommended in a proposed standard for Gray Finishes for Industrial Apparatus and Equipment now being circulated for comment and trial use by the American Standards Ass'n., 70 East 45th street.

# Wood's PULLEYS

## ALL TYPES . . . ALL SIZES

**TAPER CONE PULLEYS** — a diversity of patterns enables us to make these pulleys in a wide range of sizes to meet your every need.

**"SURE-GRIP" SHEAVES** — with interchangeable hubs—available from stock in A, B, C and D sections.

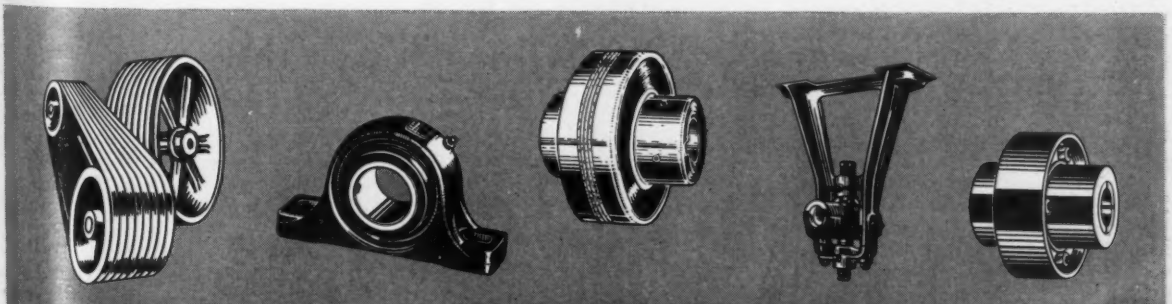
**STANDARD PULLEYS** — solid or split through rim and hub with straight or standard crowned face.

**SPECIAL PULLEYS** — flexible pattern set-up and modern foundry facilities permit us to make *made-to-order* pulleys without delay.

All Wood's Pulleys are of cast iron . . . accurately bored to specified shaft size and carefully balanced for true running. Write for detailed information.

*One-piece flanged and split tapered hub—of the "Sure-Grip" Sheave—permits easy installation and removal from shaft.*

**T. B. Wood's SONS COMPANY**
**CHAMBERSBURG, PA.**



BRANCHES: BOSTON, MASS. NEWARK, N. J. PITTSBURGH, PA. CLEVELAND, OHIO DETROIT, MICH.

# Good Men, and How to Attract Them

## *To the Paper Industry as a Career*

**By A. C. MONTEITH**
**Vice-President, Westinghouse Electric Corp., Buffalo, N. Y.**

Electric power and paper making are both old industries. They lack luster by comparison with these newcomers. If you and we are to compete successfully with them for the attention of the new generation of graduates, we must do something positive about setting forth the opportunities, the unsolved problems, the fascinating ventures that lie ahead in the more stable fields. A selling job must be done. At Westinghouse we adopted a multi-point program with the objective of obtaining good young men to keep our organization virile and progressive.

First, we determined not to be backward in telling about what electric power has to offer. We decided not to let some of the events of the past 15 years shake our faith in our industry. Any lack of faith in ourselves we were sure would be both unjustified and would wreck our efforts to sell ourselves to those surveying the fields for their future jobs. Young men are very quick to sense any uncertainty. Our business is old and solidly established, but that very stability has much to attract young men planning their future. Beyond that, our industry—and yours equally so—has an assured future of growth not exceeded even by the younger and seemingly more colorful fields. Furthermore, it is chuckfull of unsolved problems, new developments, new uses for our products. We are still operating on the straight-line portion of the opportunity curve. We believe it heartily ourselves and we set out to establish that fact with students. Sometimes the answer is simpler than anticipated and you will never know until you press your point.

Second, we determined to work closely with schools. If they know our problems, they can program their work to turn out a more acceptable product.

The schools should, we believe, be asked to concentrate on fundamentals. This is even more essential as the industry expands in new directions. Industry should assume the responsibility of orienting the man into its business, or providing the specialized training. If we accept this responsibility of specializing the student, the schools can dwell on fundamentals. The schools should turn out engineers, not specialists. The field has become too broad to expect specialization in the undergraduate training. With this understanding, the schools would have a better opportunity to give good courses in engineering fundamentals in four years.

A. C. MONTEITH

Next, we recognize we must be willing to supply some professors of high caliber, who have practical experience and can guide a course in fundamentals to meet our needs. To lose a good man to academic work is often a painful loss at the time, but it is one way to help in a practical manner.

Furthermore, we have determined to maintain continuing contact with professors. This can be done through summer employment and providing classroom material helpful in teaching a live and timely course. The summer pay need not be high, but just sufficient to defray the expenses of the man while he is away from his normal location; and the classroom material should simply be information that the professor can integrate into his course as practical examples of the use of fundamentals. A number of professors spent last summer at Westinghouse, doing specific work.

To hold a professor's interest, he must be given responsibility on his assignments. Kibitzing soon becomes monotonous. Working assignments, of course, bring him into contact with but a limited part of the field. To fill the need of a broader grasp of our problems, a seminar was arranged. This seminar was conducted by our best experts in their respective fields. We outlined what we did with the schools' products after they came with us and also presented some of the technical and industrial relations problems that are before us. This gave opportunity to discuss the mutual problem of curriculum with the professors, allowing us to formulate our course to fit in with the work being done by the schools. Furthermore, it gave the professors an opportunity to see the living problems of industry. It also brought the professors from many schools together, allowing them to interchange ideas on their immediate problems. We received very favorable reactions from those participating, both our people and professors, and it is our intention to continue this program.

Prominent men in the industry should be encouraged to talk to student bodies. Many schools welcome this, provided, of course, the material presented is a good, fundamental discussion. Also, opportunities present themselves to talk to student branches of A.S.M.E. and A.I.E.E. and A.C.S. The students are eager to learn about developments in industry for which they are training.

It is desirable to have good, modern equipment in colleges for training purposes. Westinghouse has installed over 25 steam laboratories and over 100 electronics sets in technical schools, at a special price. The electronic equipment was planned purposely to illustrate both industrial and power types of equipment to show the students that the power field is a broad one, and that it has within it much of the glamorized electronics equipment.

Summer work for the student following the junior year is very valuable. It brings him into contact with the industry and prepares him in a practical way for his final year of formal education. He sees the end use of his training and therefore can assimilate better the more advanced fundamentals presented to him. There is one *must* in this plan. His supervisor *must* be someone who will see that he gets interesting work. Making him a file clerk or a leg man can easily discourage him with engineering. We recognize that we are educating a potential ambasador back on the campus for our industry.

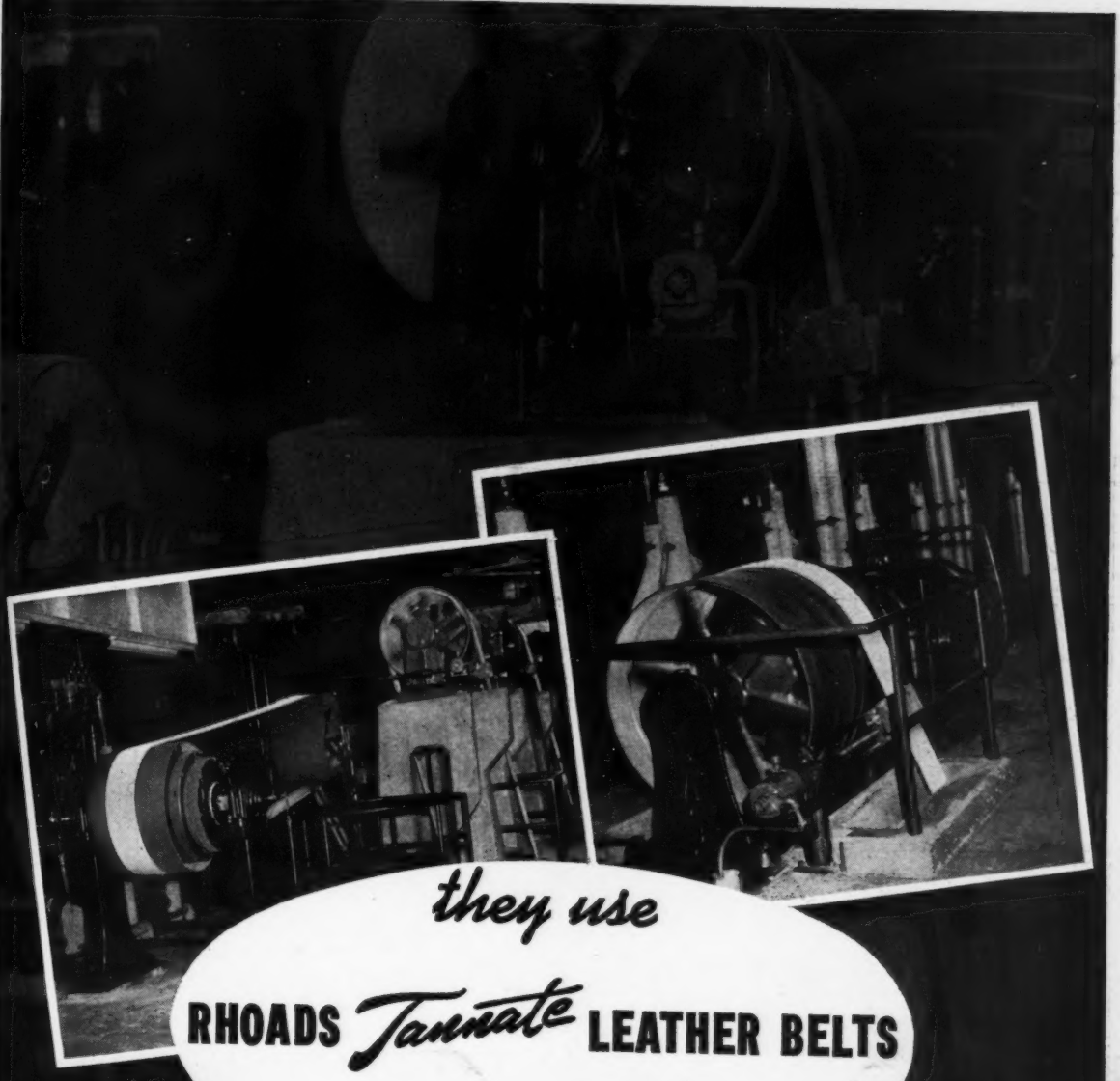
We are encouraging inspection trips through our nearby plants by students during their junior and senior years. This helps the man orient himself.

Third, we have found that having a definite training program for orienting graduate engineers into industry has been as strong a selling point in

*(Continued on page 76)*

Excerpted from an address at the Third Engineering Conference of TAPPI, Buffalo, N. Y., October 27.

# IN THIS WELL-KNOWN BOX BOARD MILL . . .



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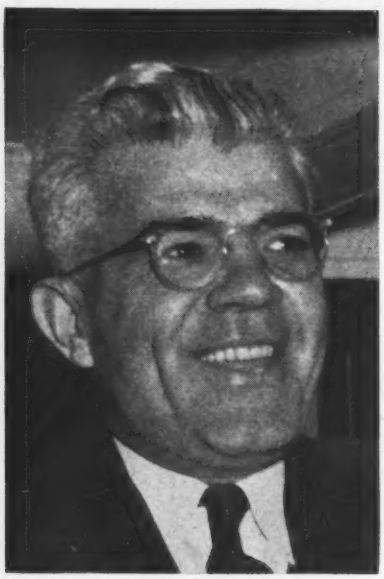
## THIRD ENGINEERING CONFERENCE COMMITTEE CHAIRMEN

(1) George Wadleigh, consulting engineer, chairman, Materials Handling Session; (2) Alvin H. Johnson, consulting engineer, chairman, Mill Design and Economic Aspects Session; (3) Philip Goldsmith of the Pusey & Jones Co., chairman, Engineering Research and Machine Design Session; (4) A. E. Montgomery of the J. O. Ross Engineering Co., chairman, Drying and Ventilating Session; (5) G. H. Pringle of the Mead Corp., chairman, Mill Maintenance & Materials Session

Members of a panel for round table discussion of "Flow of Paper Stock in Pipes" held under the supervision of the Engineering Research and Machine Design Committee at the TAPPI Engineering Conference in Buffalo. . . . Left to Right: V. deP. Gerbereux of the Worthington Pump Corp.; George V. Shaw of the Ingersoll-Rand Co.; Philip Goldsmith of the Pusey & Jones Corp.; Dr. W. Gallay of the E. B. Eddy Co.; Frank Forrest of the Allis-Chalmers Mfg. Co.; John H. Hall of the DeLaval Co.; Col. H. Wyatt Johnston of the Sutherland Refiner Ltd.; and Tony Agronin of Shartle Bros., Co.



**W. F. GILLESPIE**

President of TAPPI

—welcomed the members and guests to the various meetings.

### Good Men

*(Continued from page 74)*

our sincerity as any factor in the program. Some might feel that only a large company can afford a training program. A program can be set down for a company employing only five men a year as well as for a large company. It would be on a less pretentious scale but due to the close personal contact between the experienced personnel and the student it would be a better program than when there are a large number of students.

One fact stands out in making a graduate student training program effective. The most experienced men must understand the need for them to take time out to work with the embryo engineers. If this is not done, the young men soon pass the fact along to the next year's class and we not only lose the man but the chance of securing more. The personnel people can organize a course but its success lies with those experienced engineers who must conduct it.

Lastly, the young man should not be forgotten by the training department once he has taken a permanent position in the company. The best young men do not have to be told that education is a journey, not a destination. We have found that the better men are quite desirous of continuing some form of advanced education. Some twenty years ago we worked out a scheme with the University of Pittsburgh, whereby a man in any of our Pittsburgh area plants can learn while he earns. The man takes class work while still on the training course and at night on subjects and with lecturers approved for graduate degree credit by the University of Pittsburgh. He can take a limited number of credits toward an advanced degree from Westinghouse lecturers and the remainder must be taken on campus.

The plan has been extended to our other plant cities and with other innovations. Over 500 of our men are registered for such work this year. Over 150 Westinghouse men have taken advanced degrees through this plan.

We also find many men taking the classes for their own edification and not for credit. Every undergraduate is not a candidate for graduate work. As a matter of fact, many are not interested or have the inclination, but many do like to take some advance work to help them in their immediate work. One of the main advantages to this plan is that the man takes specialized work of immediate interest and can observe industry at the same time.

We have found this plan one of the best drawing cards for good men. We do not advocate this to the exclusion of the man staying at school for an advanced degree if the man can afford such or if he wins a fellowship. We have between 30 and 40 fellowships annually at different schools to encourage advanced education. The plan does afford an opportunity for advanced education to many who cannot afford it or who do not see the desirability of such until they get into industry.

In following the man after final placement in a permanent job, the last but most important thing is to see that he is placed with an experienced man who has an interest in young men and

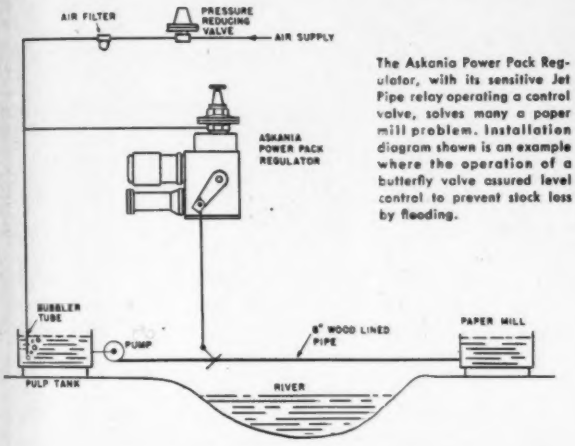
*(Continued on page 78)*

# PREVENT

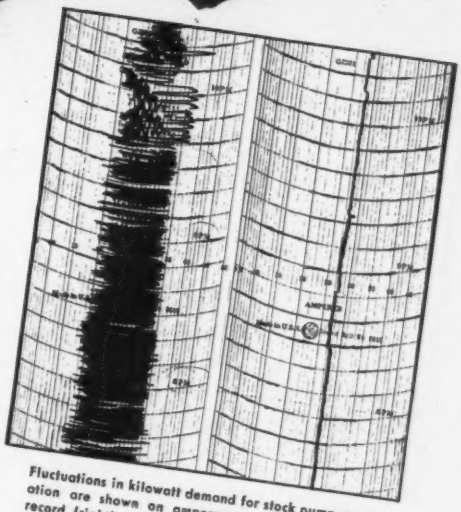
## TANK OVERFLOW
## STOCK WASTE
## MOTOR OVERLOAD

WITH

# ASKANIA LEVEL CONTROL




The Askania Power Pack Regulator, with its sensitive Jet Pipe relay operating a control valve, solves many a paper mill problem. Installation diagram shown is an example where the operation of a butterfly valve assured level control to prevent stock loss by flooding.



Fluctuations in kilowatt demand for stock pump operation are shown on amperage record (left) while record (right) indicates how Askania Level Control prevented overloading of stock pump motor.

The sensitivity of the Askania Power Pack Regulator will permit level control with an accuracy of plus or minus .01" W.C. The Regulator is a self-contained, completely packaged unit.

With the exclusive Askania Jet Pipe relay operating a control valve in the stock line, the flow is controlled with extreme accuracy to solve the problems of flooding, stock waste and motor overload.

At one mill, difficulty had been experienced in regulating rate of pulp flow with rate of production. With the pulp mill on one side of a river and the paper mill on the other, there was a stock loss by overflow at both ends of the line. Askania Level Control was the practical answer.

*If you have a similar problem, send for Bulletin 139.*

IN CANADA . . . Askania is represented in the pulp and paper industries by Sherbrooke Machineries, Ltd., with main offices and plant in Sherbrooke, Quebec. Sales offices are in Montreal, Vancouver and in Europe.

ASKANIA Controls

**ASKANIA REGULATOR COMPANY**

A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

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Ives Gehring, M. Jacobs, K. L. Moss, R. O. Lindsey, Fred Goodwill and R. Magruder enjoy the sunshine and fresh air at Poland Springs.

**JOHN WARNER**
Chief Engineer
Robert Gair Co., Inc.

*Chairman*
*Steam and Power Committee*
*TAPPI Engineering Conference*

Henry Perry, R. M. Drummond, Dr. J. T. Edwards and H. A. Morrison enjoy a few holes of golf at Poland Springs.

**J. W. HEMPHILL**
Staff Manager
for
The Pulp and Paper Industry
Johns-Manville Sales Corp.

*General Chairman*
*TAPPI Engineering Conference*

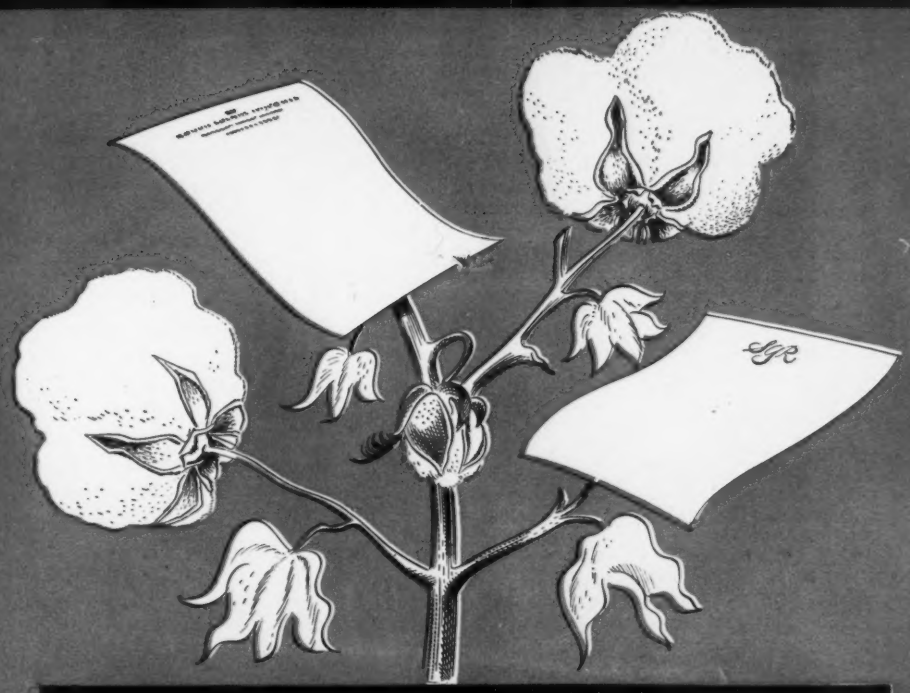
## Good Men

*(Continued from page 76)*

who will impart to him the challenges in the industry rather than the point of view of the fellow over the hill who is just eking out an existence. Let us be sure the young man gets the proper perspective and that as develops we keep moving his horizons farther out so he will not lost interest. It is inherent in a good man that he wants work with responsibility increasing with his growth in stature. This is the most important point in the development of men. Each of us can probably recall someone who gave us an invaluable lift as we progressed.

You and I are identified with great industries with bright and definite futures. Their success lies with the men we attract. The difference in men makes the difference between a decadent industry and a progressive industry. Andrew Carnegie once stated that he could be stripped of his factories and his money, but if you left him his men he could again rise to a position of leadership. The Monsanto Chemical Co., after the explosion at Texas City, counted as its greatest loss, not the millions of dollars in physical plant, great though that was, but the death of some 50 of its key personnel. We must all assume our full responsibility of interesting, training, and securing good men for our industry. Men are the key to the success of any industry.

# in high quality paper the trend is to



# cotton linters

Good usable cotton rags for papermaking are getting scarcer, more costly every day. But papermakers do not have to accept less satisfactory substitutes. Hercules Bleached Cotton Linters are rapidly gaining acceptance as high quality extenders for rags. Their performance in rag-content writing papers, for example, is well known. Their clean virgin fibers contribute good color, permanence, feel, bulk, opacity, and sheet structure to the paper. Write for helpful technical information on adapting Hercules Bleached Cotton Linters to your paper processing.

HERCULES

SIZING MATERIALS AND CHEMICALS FOR PAPER

HERCULES POWDER COMPANY
INCORPORATED
962 King Street, Wilmington 99, Delaware

# Where Is the Bright New World?

**By ROB ROY MACLEOD**

**Vice-President, Buffalo, Niagara Electric Corp.**

There is an apparent pattern in the life-cycle of nations that merits the study of Americans in these critical days. Convenient divisional periods in the life of nations are: (1) Settlement or conquest, (2) Development of extractive industry, (3) Development of manufacturing, (4) Concentration of population, (5) An increasing tax burden, (6) Diminishing liberty for individuals, (7) Decay of the national character, (8) Decline of the nation.

It is undebatable that we have passed through the first two steps, and certainly we are well into the third, since we are today the greatest manufacturing nation in the world. As to the fourth step, it is interesting to note that 61 percent of our people now live in urban communities, and history indicates about 50 percent as the danger point.

The fifth step, increasing taxation, should require little argument under present conditions to demonstrate that we are at least that far. We use one-third of our national income to run our government; history says 20 percent is a danger point.

Excerpted from an address at the Third Annual Engineering Conference of TAPPI, Statler Hotel, Buffalo, N. Y., October 25-28, 1948.

Every American should know and ponder: (1) That there are 2,569 Federal agencies spending our money; (2) That the executive branch alone now costs us $1.5 billion a year more than our whole Federal government did in 1933; (3) That 14,500,000 Americans get checks from the Federal government every month; and (4) That our Federal government is $250 billion in the hole.

Have we reached the sixth step? Historically, security has always been the bait when liberty is to be taken away. Liberty is, in reality, the safeguard of security, but time after time nations have made the fatal error of forsaking the true in pursuit of the false.

The final evidence of decay lies in the seventh step. Peoples who reach this stage seldom pull back, because it requires austerity, self-denial, and self-discipline on a national scale.

How about our national character? This is a question each one must answer for himself. Here are a few simple tests which will indicate, in general, the status of our national character—give your own appraisal: (1) Are we as willing to work as our predecessors? (2) As citizens, which do we place first—our rights or our responsibilities? (3) Which commands most of our interest—security or freedom? (4) Has our spiritual development kept pace with our technological development?

If your answers are "yes" there is no danger which we cannot meet—no difficulty which we cannot overcome; if it is "no" then your country is at least approaching that fatal seventh phase of its development. And, based on your own appraisal, what do YOU propose to do about it?

**TAPPI NOTABLES IN JOVIAL MOOD**

Left to right, seated: J. W. Hemphill, vice-president, Johns-Manville Corp. and chairman of the Third Engineering Conference of TAPPI; William H. Lee, president, Lockport Felt Co.; W. F. Gillespie, president of TAPPI. . . . Standing: Raymond J. Lee, executive vice-president, Lockport Felt Co., and R. G. MacDonald, secretary-treasurer of TAPPI.

## Pennsalt Adds Two

PHILADELPHIA—Hyman Iserson and Maurice E. Miville has been appointed by the Pennsylvania Salt Mfg. Co., as research chemists at its Whitemarsh Research Laboratories.

# Letters

Dear Mr. Heitzeberg:

We notice in the November 4, 1948, issue of your magazine that you have stated "$1,000,000 Box Plant—West Cambridge, Mass. A permit to erect a $1,000,000 corrugated box plant here has been issued to the Robert Gair Co."

We did get a permit for such a plant about two years ago, and completed the plant about one year ago. As far as I know no expansion is anticipated at the present time, and we wonder how you got the report, and whether or not it would be desirable to correct it in another issue. Apparently, it has not passed unnoticed because we have had several requests in the past few days for an opportunity to bid on a new plant in Cambridge.

W. V. FARWELL
Secretary
Robert Gair Co., Inc.

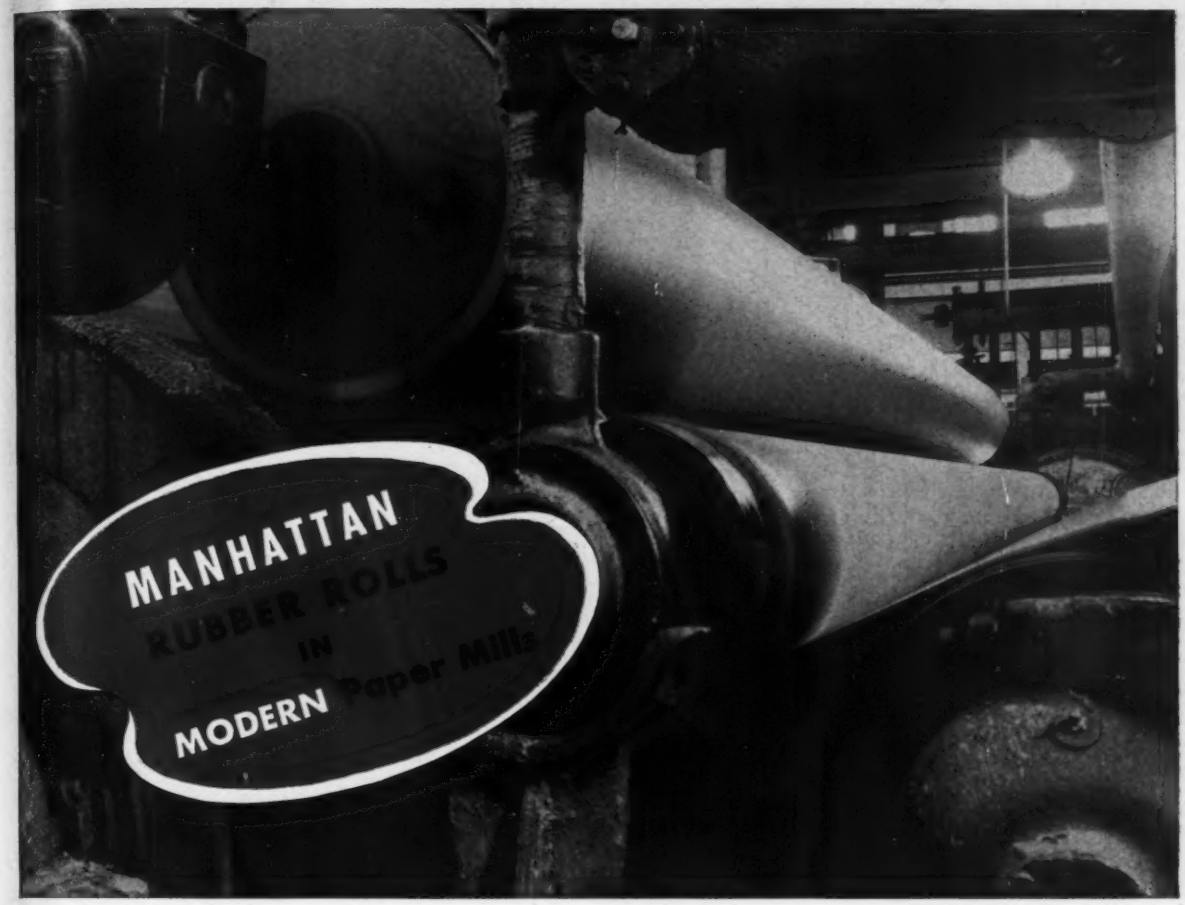
Dear Mr. Gordon:

As President of The Association of American Wood Pulp Importers, I am writing to you at the request of the Swedish Cellulose and Wood Pulp Associations in reference to the comments headed "British-Swedish Prices" appearing on page 24 of your issue of October 21st. Under this heading there is reference made to a report in a leading British trade weekly that the Swedish Pulp Association decided to make certain price reductions as a consequence of the removal of the Swedish export levy on wood pulp.

The Swedish Cellulose and Wood Pulp Associations take exception to this statement as being entirely incorrect and wish to emphasize that all decisions referring to sales and prices are taken individually by the members and that it is not within the power of said Associations to make such decisions, and consequently no such decision has been made.

They therefore ask if you will kindly, in your next issue of the Paper Trade Journal, correct this matter so that your readers will know that the report in the British trade weekly was, as above stated, quite incorrect.

JAMES DONALDSON
President
Ass'n. of American Wood Pulp Importers




## Cooperative Engineering Helps Boost Production

Manhattan has always afforded cooperative engineering service, working with paper mill engineers to reach all-time production records. Rubber-Covered Rolls play a vital part in the close control of quality needed for faster, modern machines.

Most papermakers have special requirements of density and crown, developed from long experience with the particular stock being run on their fourdrinier or cylinder machines. Manhattan engineers interpret these requirements into the manufacturing and covering of their rolls. Continuous tests and inspections by Manhattan craftsmen with up to 40 years of experience insure delivered rolls of uniform reading, perfect bond to metal and maximum elasticity for long life.

Longer wire and felt life, less down-time for roll recovering, and lower spoilage in production are real money-saving reasons for you to call the Manhattan Man to review your paper making problems . . .

*(Keep Ahead with Manhattan)*

**ROLL-COVERING PLANTS AT PASSAIC N. J. . . . NEENAH, WIS. . . . NORTH CHARLESTON, S. C.**

**RAYBESTOS-MANHATTAN INC.**

MECHANICAL RUBBER PRODUCTS — RUBBER COVERED EQUIPMENT — FRICTION MATERIAL — ASBESTOS TEXTILES
PACKINGS — POWDERED METAL PRODUCTS — ABRASIVE & DIAMOND WHEELS — BOWLING BALLS

**MANHATTAN RUBBER DIVISION** **PASSAIC, NEW JERSEY**

# Labor Relations Within Industry

**By AUSTIN M. FISHER**

**Fisher Associates, 250 Park Avenue, New York, N. Y.**

Throughout the industrial world it's a pretty commonplace occurrence to hear that a given union is Communist-dominated, but when you use this description, many of us have then exhausted our knowledge of the whole situation. In other words, we too often lack precise information about what Communism means to American labor and what it means to American management in terms of its daily impact on the lives of human beings.

I would be very insincere with you if I expressed the opinion that we in American management are doing a good job of combating this menace to our freedom; this internal menace to our freedom. Most of us are frightfully complacent about the problem. We indulge ourselves with a sort of It-can't-happen-here attitude. In fact, the president of one large southern company I visited not long ago said to me: "You know, Fisher, this is essentially a problem for you fellows in the North." He said, "We haven't even got a union here, and why should I spend money on what you call economic education of the workers?"

Well, six months later, when he was faced with electing a union and with crippling economic demands, I think this manager was able to find his own belated answer to what, at the time, was a somewhat short-sighted question.

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An address delivered at the Southern and Southeastern Divisions meeting of the American Pulp & Paper Mill Superintendents Ass'n. at the Atlanta Biltmore Hotel, Atlanta, Ga., October 21, 1948.

The fact of the matter is, whether we want to believe it or not, every employer in the United States is more vulnerable to Communism than he is to small-pox. That's true whether he has or has not a union; whether he is in the North, South, East or West. Both Communism and small-pox thrive on the same conditions. They thrive on ignorance and lack of understanding. But if you would inoculate against Communism, don't begin to inoculate your employees after they start to run a fever. Borrow a lesson from the doctors while it is still effective.

The best place to start is on yourself. I would risk the opinion that 95 percent of the employers I met, and they run into the hundreds, are actually illiterate about Communism; about its techniques; about its aims; about its psychology. They simply don't understand the enemy and are, therefore, completely incapable of planning an effective counter-offensive.

This is equally true, I am sorry to say, of most of the trade associations you support. For the most part, these associations—and I am talking about the big, national ones—are staffed with public relations men who understand the parlor-car but have no comprehension at all of the picket line. The copy they write sounds like an atom bomb in the Executive Club, but it's a wet Chinese fire-cracker to the guy in the corner saloon.

As a result, most of the trade association campaigns consist of a series of love letters to the biggest contributors who continue to pay and pay on the theory that anyone who can make a dividend sound patriotic deserves to be supported, and they do it generously; but let's not kid ourselves. The biggest contribution some of these associations could make to the American Way would be to dissolve, because their name has soured the American people and they are, therefore, completely incapable of doing a selling job to support them and the folks who they represent. Their endorsement too often is a kiss of death. Aside from the fact that they don't know what they are doing about Communism, even if they did they wouldn't be in a position to do it.

No doubt all of you have from time to time seen the full-page ads that have been run by these various associations. It seems to me that it's a little bit like going after a rhinoceros with a fly-swatter.

I want you to form your own conclusions, and I have brought with me today a left-wing film, produced by the United Radio and Electrical Workers, CIO. This union has been characterized by James Carey, who is secretary of International CIO, as a Communist-dominated union. My own experiences with them would confirm Mr. Carey's characterization. The picture you are going to see is a powerful film; an extravagant one. I have had its cost estimated by a half dozen producers and the lowest figure I got was $50,000. As you see it I hope you will make a point of observing some of the tricks of the trade which are more commonly observed only by folks like myself who are interested in problems of public relations; who are interested in public opinion and in the methods that are used to sway public opinion. Note, for one thing, the very careful manipulation of symbols employed by the people who produced this film. Note the use of F.D.R.'s voice, the late President's voice. It has a magic in it for millions of people in this country. If you can use that voice, presumably on behalf of a proposition that you advocate, you bring enormous emotional validity to the argument you make. Note how they have used his voice. Note, too, how they have used one of the best campaign pictures ever produced: Roosevelt at Casa Blanca, with the flowing cape and hair. They have used that. Note the use of Abraham Lincoln who is venerated by millions of Americans in Democratic and Republican life. And as you see this picture ask yourself whether any place on the

*(Continued on page 84)*

**UNION'S TRUCK-TRAILERS GIVEN "NEW LOOK"**

**Setting an individualistic style in truck-trailer appearance, the new corrugated container trucks operated by the Union Bag & Paper Corp., New York City, are painted in contrasting shades of brown and buff. Both the company name and shield, shown with the product, are executed in orange. The color scheme is calculated to be seen at great distances and under even the poorest light conditions. Last year Union Bag purchased Corrugated Containers, Inc., in Chicago, and the Trenton, (N. J.) Container Co. It also operates a box plant near its pulp, paper and bag plant in Savannah, Ga. Trucks reflecting Union's "new look" will soon appear in each of these areas.**

**TITANOX** . . . *the brightest name in titanium pigments*

## the qualities of heavy sheet opacity imparted to lightweight stocks

When your lightweight paper is processed with TITANOX pigments you're sure of giving it an opacity comparable with that of heavyweight stocks. Thus "show-through" is materially reduced.

What's more, printers and users of printed material prefer paper treated with these titanium dioxide pigments because such paper also has a whiteness and brightness that's unsurpassed in attractiveness, printability and sales appeal.

The TITANOX line is still in greater demand than its supply, although production is being increased steadily. In case you are unable to get all the pigment you need, our Technical Service Laboratory will help you make the most of what you do have. Get in touch with our nearest office.

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**TITANIUM PIGMENT CORPORATION**
*SOLE SALES AGENT*

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**2600 S. Eastern Ave., Los Angeles 22, Cal.**

6484

## Labor Relations

*(Continued from page 82)*

scene of American industry American business is doing as good a job. We will now have the film.

(Film shown.)

MR. FISHER: I don't know how many of you have seen that picture before. If you have — it was shown around rather widely in American industrial circles. I think those of you who have seen it for the first time will be impressed by its technical skill and dexterity. I think you have to admire your opposition, even when it hurts.

This film is merely an example of a new level to which labor relations in this country is now moving.

In talking before a group of students in one of the universities in the East I pointed out to them that the classical objectives of the trade union movement were relatively simple ones. They involve wages, hours, and working conditions. The provisions of the average labor contract carry the things that ultimately became slogans in the very conservative labor movement that we used to have.

But that has been changed and it has been changing rather rapidly over the last six or seven years and it is reaching a climax now where the unions are no longer content to seek better wages, shorter hours, and improved working conditions for the people they represent, but are making a rather desperate struggle for the control of their hearts and minds.

I told you I just returned from a trip and was disturbed by what I found. I want to tell you a little bit about it. I find this — and I consider myself somewhat of a student of Communism in American labor—I find out that word has gone out to turn the Communist Party in this country into as excited a revolutionary outfit as the American people will stand. They have been instructed to go the limit. Go the limit to the point only where they face destruction by the police.

I think this means that every Communist and every left-wing labor union has been instructed to debate with police; create picket lines; provoke the type of upheaval of which this picture was a mere example.

The Communist Party now plans, in mid-November, before the CIO Convention in the Far West, on the 22nd, to hold a meeting in one of the Mid-Western cities. The purpose of this meeting is to determine whether to form a third labor party which will act as a shelter for the left-wing unions. That would mean, of course, that the present affiliations of these unions with either A. F. of L. or CIO, for the most part the CIO would be discontinued and that they would then assume identification with a new group. This decision will be made before the CIO Convention on the 22nd.

Now, if they vote CIO, the unions will still operate underground. That is, the left-wing unions. They will still operate underground in most of the larger cities of this country. The maneuver itself will be launched along the traditional lines of the so-called industrial groups, which the Communists have been maintaining for a great many years in a great many Locals.

In addition a propaganda machine will start turning. The so-called workers schools will be resumed in 20 or 25 major focal points in this country.

This may all sound rather strange to you; rather remote; sort of a never-never land; but it's not. It has happened all over the world, gentlemen. It happened in Hungary. It is happening today in France. You can't translate the French coal strike except in those words. It cannot be explained in any other way. It happened in Italy and it can happen here. It is happening here.

This picture that you have seen was produced in 1946. It was produced at the time when left-wing unions in most cases still enjoyed the tacit endorsement, at least, of the CIO. The break has come. It doesn't mean that left-wing unions are going to die a natural death. It means that they must seek a new organization of their own. It means, therefore, a more turbulent period in 1949 than we have witnessed at any time in the last generation on the American labor scene. That means something to you. It means something to you whether you have a union or whether you don't. It means something to you whether you are located in the far South, or in the industrial East, or in the West. It makes a great difference to you because it has a profound effect on the thinking and psychology of workers from one end of the land to the other. The pattern of increases that were made in Detroit were felt in Louisiana; they were felt in Texas; they were felt in Arkansas. The attitude of the unions were expressed with respect to pensions; with respect to Social Security benefits. No matter where they are generated, they translate themselves right into your mills and to the extent that your own practices do not conflict with these so-called patterns, you yourselves will feel this pressure.

There is no single, obvious moral to be pointed out about this problem. Communism in the labor movement grew in this country, as I said earlier, because of the ignorance of many of the men and women who were exposed to it. That ignorance is nothing that we in American industry can place the burden merely upon our public school system. It is not enough to say: Well, the schools ought to do a better job. That is theoretical. It is academical. The fact is that these people do not have any understanding of the way our economic system functions. If they did, a picture such as this would be impossible, and laughable.

And yet I have attended local meetings of trade unions from one end of the country to the other and I have seen this picture and others like it. This is not a one-shot lubrication. At least such—half a dozen such pictures are being circulated among millions of workers, and wherever they are shown they are met with applause and they are met with conviction. Those pictures, to the extent that they are spreading an anti-public propaganda throughout this country are harming you. They are undermining you. They are making your words suspect. They are getting you into a situation where not a single one of American business's spokesmen is able to get a receptive or an intelligent hearing. Millions of people whose points of view have been slowly corroded and corrupted.

It is likely to be said: This is somebody else's job. Let somebody else do it. But that will not do the trick. And unless you, each one of you, pay just as much attention to the economic literacy of your workers as their adherence to safety regulations, or adherence to your disciplinary code; then in my opinion you are making a profound mistake; a mistake that will cost you very dearly in the years to come.

I am not here trying to frighten you. I think, that handled properly, American business can come out on top, but I speak to you with this degree of frankness and I show you this picture merely to awaken you to the fact it is not enough merely to provide a good job with good pay. You have got to go further. I hope you will.

(Applause.)

### EMPLOYES HONORED

**The Fort Howard Paper Co., Green Bay, Wis., honored 47 members of its Quarter Century Club together with their wives and guests, in ceremonies at the Beaumont Hotel on November 3. . . . Pictured above is A. E. Cofrin, president of the company (left), being presented with a service pin by Henry E. Lewis, club president (right). . . . The club is made up of employes who have been with the company for 25 years or more. . . . Six have served a minimum of 29 years each; ten, 28 years; ten, 27 years; twelve, 26 years; and seven, 25 years.**

# How important is Leakage?

**NEW!** Paper drinking cup makers and producers of similar types of food containers have successfully tested **CUP-SEAM** — a new Resyn* adhesive that is highly water resistant and able to withstand contact with both hot and cold liquids for a prolonged time without leakage.

**CUP-SEAM** has been acclaimed with unusual enthusiasm after months of field usage. It is a white emulsion that dries to a clean, colorless film. It is odorless . . . free from solvents . . . non-toxic.

**CUP-SEAM** has been tested on regular equipment at high speeds. It has excellent machineability . . . is quick tacking, fast drying, non-staining . . . has a bonding strength that exceeds that of the paper. Yet, its film flexes as easily as the paper it bonds.

**CUP-SEAM** — which seals liquids *out* as well as *in* — is now in full supply ready for immediate and steadily maintained deliveries.

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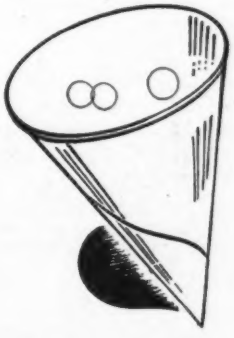
**Offices:** 270 Madison Avenue, **NEW YORK** 16; 3641 Washtenaw Ave., **CHICAGO** 32; 735 Battery Street, **SAN FRANCISCO** 11; and other principal cities. **IN CANADA:** Meredith, Simmons & Co., Ltd., Toronto and Montreal. **IN ENGLAND:** National Adhesives, Ltd., Slough.



National ADHESIVES

*EVERY TYPE OF ADHESIVE FOR EVERY INDUSTRIAL USE*

# Seeking Tariff Modification

WASHINGTON—Sweden, Finland and other countries have furnished the State Department with a wide list of paper and paper products on which they may seek modifications in the present 1930 U. S. tariff rates when imported into the United States, it was revealed by the State Department in a list dated November 5, which has now been made public by the U. S. Tariff Commission.

The State Department at that time issued an announcement by the Interdepartmental Trade Agreements Committee of this country's intention to enter into negotiations with 11 foreign countries in April, 1949, looking to new reciprocal trade arrangements under the 1930 Tariff Act. Such new terms would then be embodied in the General Trade Agreements already concluded with 22 countries October 30, 1947.

Countries with which negotiations are scheduled are Finland, Sweden, Denmark, Italy, Greece, Dominican Republic, Haiti, El Salvador, Nicaragua, Peru and Uruguay.

The list of articles imported into the United States which it is proposed should be considered in trade agreement negotiations next April, includes the following, among others:

*Denmark*—gummed papers, not specially provided for.

*Finland*—paperboard and pulpboard, including cardboard, not plate finished, supercalendered or friction calendered, laminated by means of an adhesive substance, coated, surface stained or dyed, lined or vat-lined, embossed, printed, decorated or ornamented in any manner, nor cut into shapes for boxes or other articles and not specially provided for (except pulpboard in rolls for use in manufacture of wallboard; wallboard; insulating board; fiberboard; leather board or compress leather; and strawboard).

Greaseproof and imitation parchment papers which have been supercalendered and rendered transparent or partly so, by whatever name known; wrapping paper not specially provided for (except strawboard and straw paper known as wrapping paper, less than 0.012 but not less than 0.008 inch in thickness).

Mechanically ground wood pulp, chemical wood pulp, unbleached or bleached.

Standard newsprint paper.

*Italy* — cloth-lined or reinforced paper; labels, flaps, and bands composed wholly or in chief value of paper lithographically printed in whole or in part from stone, gelatin, metal or other material, but not printed wholly or in part in metal leaf and not specially provided for, all the foregoing, if not exceeding 10 square inches cutting size in dimensions, embossed or die-cut, and if printed in less than eight colors.

Drawing and similar paper weighing 8 pounds or over per ream and valued at less than 40 cents per pound, not ruled, bordered, embossed, printed, lined, or decorated in any manner.

Book covers wholly or in part of leather, not specially provided for.

All post cards (not including American views), plain, decorated, embossed or printed except by lithographic process.

*Italy*, continued: braids, plaits, and laces composed wholly or in chief value of straw, chip, paper, grass, willow, etc., for making hats.

Talc, steatite, soapstone, French chalk, etc.

*Sweden* — Compounds of cellulose, known as vulcanized or hard fiber, made wholly or in chief value of cellulose; caustic potash, caustic soda; Fourdrinier wires and cylinder wires, suitable for use in paper making machines; woven-wire cloth, suitable for use in manufacture of Fourdrinier wires or cylinder wires; machines for making paper pulp or paper and parts thereof.

Wallboard, including insulating board and fiberboard, not plate finished, supercalendered, etc.; greaseproof and imitation parchment papers.

Sulphate and sulphite wrapping paper not specially provided for.

Chemical wood pulp, unbleached (except screenings and soda pulp).

# American Paper and Pulp Ass'n Convention

### *Waldorf-Astoria February 20-25*

NEW YORK—The Annual Convention of the American Paper and Pulp Ass'n., and Member Associations will be held at the Waldorf-Astoria during the week of February 20-25, 1949.

"Rooms will be difficult to obtain again this year . . . You are, therefore, urged to write direct to the hotels listed below and reserve accommodations promptly, since commitments will be held only to February 10," E. W. Tinker, executive secretary, cautions. "In making requests, please advise the hotel the name of your company to insure that Divisional Association members will benefit from space that is being held for them.

"The Waldorf-Astoria has set aside, as usual, 200 rooms for us: the Shelton Hotel 25 rooms and two suites; the Belmont Plaza, 150 rooms and 20 suites consisting of living room and double bedroom. The Barclay and Lexington Hotels will, within limits, take care of those who have been guests of the hotel previously. For your convenience in securing reservations there follows a list of individuals to contact at the various hotels: Waldorf-Astoria, Mr. Lewis—50th street and Park avenue; Belmont Plaza, Miss Kramer—Lexington avenue and 49th street; and Shelton Hotel, Mrs. Christie—Lexington avenue and 49th street.

"The APPA Annual Dinner will be held on February 23, in the Grand Ballroom of The Waldorf-Astoria and the Salesmen's Association Luncheon will be held February 22. Details of these two annual affairs will be sent you later but reservation blanks will not be mailed until January," bulletined Association members on November 9.

**MECHANICAL PULPING CONFERENCE CHAIRMEN**

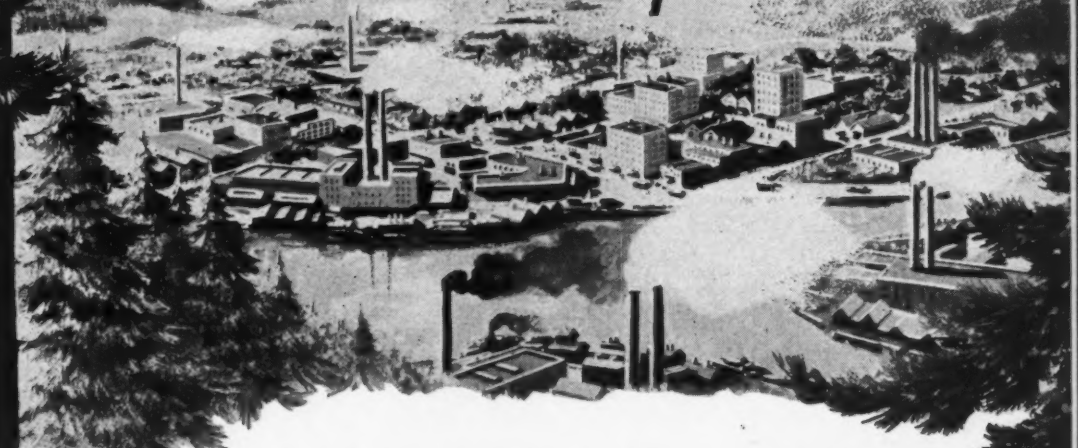
(1) A. E. Backman of the Missisquoi Co., chairman, Slime Control Session; (2) W. W. Holland of the Quebec North Shore Paper Co., chairman, Screening Thickening, Refining Session; (3) F. C. Goodwill of the St. Regis Paper Co., chairman, Bleaching Session; (4) George C. Shipman, Donnaconna Co., chairman, Hardwoods Session

## Swedes Court Japs

TOKYO—Allied headquarters officials said on November 2 that daily conferences are taking place here to increase trade between Japan and Sweden. Sources close to a visiting Swedish delegation said Sweden was eager to rebuild trade connections with Japan, especially in Kraft pulp, high quality steel, chemicals and paper.

True conservation of our forests is proper growth, proper use. A crop is grown, a crop is taken. But the wealth of the woods remains. R. K. Ferguson PRESIDENT

# Every smokestack is a prospect for Panelyte



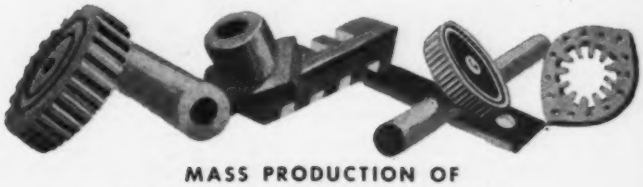
Let smokestacks tell the story! Every factory in America makes some product or has some moving part or some piece of working equipment that can be made better, or cheaper, or *both*—with Industrial Panelyte.

This resin-impregnated hot-pressed laminated plastic goes down to the sea in ships... travels the highways in over a score of automotive parts... soars through the skies in airplanes . . . is in all sizes of transformers—from Boulder Dam to a toy electric train. Every one of more than 50 grades of Industrial Panelyte is a special combination of properties with varying characteristics. And there are also decorative grades.

Panelyte Division of St. Regis Paper Company manufactures most of its own resins and draws heavily on the parent company for the papers used as base. Like all St. Regis papers they are made in St. Regis mills, from pulp which in large measure is manufactured in St. Regis plants and supplied by St. Regis woodlands.

**ST. REGIS PAPER** *Company*

230 PARK AVENUE, NEW YORK 17, N. Y.



MASS PRODUCTION OF
SHEETS, RODS, TUBES, MOLDED FORMS, FABRICATED PARTS

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THE STRUCTURAL PLASTIC

Quick facts about ST. REGIS

| 1,000,000 ACRES OF TIMBERLAND | MILLS & PLANTS IN 30 LOCATIONS | ASSETS OVER 145 MILLION DOLLARS | 13,200 EMPLOYEES | OVER 17,000 STOCKHOLDERS |
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BAG SYSTEMS—Bags and Bag Filling Machines

## AMERICAN PAPER AND PULP ASSOCIATION'S PRODUCTION RATIO REPORT*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

| Current Weeks—1948 | | Corresponding Weeks—1947 | |
|---|---|---|---|
| October 2 | 98.6 | October 4 | 109.5 |
| October 9 | 98.4 | October 11 | 108.4 |
| October 16 | 99.9 | October 18 | 108.3 |
| October 23 | 98.7 | October 25 | 110.2 |
| October 30 (Revised) | 99.3 | November 1 | 111.1 |
| November 6 | **98.1 | November 8 | 108.9 |

COMPARATIVE MONTHLY SUMMARIES

| 1947 | | | | | | 1948 | |
|---|---|---|---|---|---|---|---|
| Jan. | 102.1 | May | 106.2 | Oct. | 109.5 | Jan. | 100.3 |
| Feb. | 105.9 | June | 106.2 | Nov. | 109.3 | Feb. | 99.8 |
| Mar. | 106.1 | July | 95.5 | Dec. | 101.5 | Mar. | 100.8 |
| Apr. | 105.1 | Aug. | 104.2 | Year Avg. | 104.3 | Apr. | 100.8 |
| | | Sept. | 102.0 | | | May | 100.5 |
| | | | | | | June | 95.7 |
| | | | | | | July | ‡88.1 |
| | | | | | | Aug. | ‡96.8 |
| | | | | | | Sept. | ‡91.8 |

‡ Preliminary Ratios.

COMPARATIVE YEARLY SUMMARIES

| | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|---|---|
| Year to Date | 96.6 | 91.9 | 88.4 | 88.5 | 89.3 | 101.3 | 101.3 | 97.1 |
| Year Average | 97.4 | 90.4 | 87.8 | 88.1 | 89.4 | 101.1 | 104.3 | |

** Indicates 1948 volume of 176,758 tons—Comparable week 1947—172,588 tons.

PAPERBOARD OPERATING RATIOS†

| Current Weeks—1948 | | Corresponding Weeks—1947 | |
|---|---|---|---|
| October 2 | 96 | October 4 | 100 |
| October 9 | 96 | October 11 | 102 |
| October 16 | 97 | October 18 | 101 |
| October 23 | 95 | October 25 | 101 |
| October 30 | 96 | November 1 | 100 |
| November 6 | 95 | November 8 | 102 |

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Year Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1947 | 99 | 103 | 101 | 100 | 101 | 101 | 90 | 99 | 96 | 101 | 99 | 89 | 98 |
| 1948 | 99 | 100 | 102 | 102 | 100 | 94 | 81 | 92 | 91 | | | | |

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

## De-Inking

*(Continued from page 70)*

Gardner, C. E., Lee Paper Co.; Gephart, O. P., A. M. Meincke & Son; Germanson, R. C., Kalamazoo Vegetable Parchment Co.; Goloff, St. Regis Paper Co.; Goodwill, F. C., St. Regis Paper Co.; Greene, D. H., Otsego Falls Paper Mills; Hoan, E. R., Haviland Products Co.; Hamilton, F. R., Allied Paper Mills; Hanson, Peter S., Central Paper Co.; Hartel, B. D., Buffalo Pumps, Inc.; Hartung, J. W., St. Regis Paper Co.; Hathaway, W. F., Kalamazoo Vegetable Parchment Co.; Heenan, J. A., Sutherland Paper Co.; Henderson, Thomas P., Hollingsworth & Whitney Co.; Heuer, J. H., St. Regis Paper Co.; Hodgemire, F. M., Hawthorne Paper Co.; Holmes, S. Richard, Gardner-Richardson Co.

Jensen, P. M., Dow Chemical Co.; Johnson, L. S., Hummel & Downing Co.

King, John R., Rex Paper Co., Kirkpatrick, W. A., Allied Paper Mills, Kukolich, Stephen, Lee Paper Co.

La Liberte, L. H., Kalamazoo Vegetable Parchment Co.; Lemense, A. J., Eddy Paper Corp., Luey, Thom., American Coating Mills; Lunsford, W. A., Hercules Powder Co.

Marshall, J. T., Ingersoll-Rand Co.; Ken McClelland, J. E. Rhoads & Sons; McClaran, Jesse W., National Starch Products; Militzer, Don, Garrett Burgess, Inc.; Moore, Ken, Champion Paper and Fibre Co.; Moyer, Jerrold H., Champion Paper & Fibre Co.; Murray, L. E., St. Regis Paper Co.

Ninneman, R., American Coating Mills, Nundorf, Henry, Rex Paper Co.

Olm, Fred J., St. Regis Paper Co.

Pearson, H. G., Pioneer Paper Stock Co., Peeters, Richard, St. Regis Paper Co.; Perlick, Al, Kalamazoo Vegetable Parchment Co., Pete, R. H., E. I. Du Pont de Nemours, Inc., Plantefaber, J. C., Rocky River Paper Mills, Inc.; Plantefaber, N. K., Rocky River Paper Mills, Inc.

Rady, Chas. B., Sutherland Paper Co.; Randall, Ivan, Allied Paper Mills; Ream, Orville, St. Regis Paper Co.; Reid, John T., Spencer Kellogg & Sons, Inc.; Riedel, A. Wm., Gus Riedel & Son; Roderick, H. F., Wyandotte Chemical Corp.; Root, E. M., Dilts Machine Works; Root, Frank A., Clinton Industries, Inc.

Schroeder, W. J., Buffalo Electro-Chemical Co.; Schuler, R. C., E. I. Du Pont de Nemours & Co.; Schwandt, W. R., A. E. Staley Manufacturing Co.; Sheehan, Walter A., Dow Chemical Co.; Sheldon, Fred R., Buffalo Electro-Chemical Co.; Sherwood, A. L., Sutherland Paper Co.; Smith, C. B., Noble & Wood Machine Co.; Smith, L. J.; Steffes, Seb, Otsego Falls Paper Mills; Stewart, Robert B., Kalamazoo Vegetable Parchment Co.; Sutton, Glen, Sutherland Paper Co.

Taylor, Hayden A., Shartle Bros. Machine Co.; Thoma, Paul, Time, Inc.; Thompson, R., St. Regis Paper Co.; Toonder, F. E., Wyandotte Chemical Corp.; Trelfa, Dick, Hercules Powder Co., Inc.; Tubbs, R., American Coating Mills; Turala, S., American Coating Mills; Turley, E. W., Philadelphia Quartz Co.

Underhill, Jack, Ohio Knife Co.

Van Buren, C. E., Albany Felt Co.; Vanderberg, H., A. E. Staley Manufacturing Co.; Verdon, J. R., American Cyanamid Co.

Walters, R. E., Pulp & Paper; Webber, Charles, Bristol Co.; Weller, Arnold, Sutherland Paper Co.; Wilde, E., St. Regis Paper Co.; Wise, James A., Kalamazoo Paper Co.; Woollam, A. E., Goulds Pumps, Inc., Worst, John N., Sutherland Paper Co.

Zwecker, W. R., consulting engineer.

## N. Y. QM-Navy Bids

Invitations to Bid have been issued by the New York Quartermaster Purchasing Office, 111 East 16th Street, New York City., on QM-30-280-49-496, covering the following items: Pad, memorandum, sub. 16, White, ruled (blue ruled 1 side only) 233,000 each; Paper, blotting, standard, sub. 100, 19 x 24", moss green, 220,000 sheets; Paper, carbon, duplicating, purple, spirit type, 8 x 13", 15,000 boxes; Paper, carbon, typewriter, black, lt.wt., med. coating—3 sizes, 820,000 boxes; Paper, computing, machine, white, 2 roll sizes, 75,000 rolls.

Bids will be opened 1 December, 1948, at 1:00 P. M. (EST) at the New York office. Delivery to be completed by 31 March, 1949.

QM-30-280-49-424 — Folders, File, Manila, Vertical, 2 sizes, flat type, heavy, plain bottom, 7,000,000 ea. Bids will be opened on Nov. 24 at 3:00 P.M. (EST) at the New York Office. Delivery—by April 1949.

QM-30-280-49-458—Paper, typewriter, bond, sulphite, sub. 16-lb., Canary, size 22 x 34 inches, 3,500 reams. Bids will be opened on November 12, 1948 at 4:30 P.M. (EST) at the New York office. Delivery: complete by 31 December 1948.

Invitations to bid have been issued by the Navy Purchasing Office, 111 East Sixteenth street, New York City, on the following items:

Invitation No. 3643—Paper, Litho, coated book, white, for letter press printing, 100,000 sheets. Delivery: 30 days—to Naval Recruiting Bureau, Baldwin, L. I., N. Y. Bids will be opened on November 22 at the New York office.

Invitation No. 3618—Paper, Pressboard, in various sizes and thicknesses, 264,000 sheets. Delivery: 60 days—to various destinations. Bids will be opened on November 22 at the New York office.

Invitation No. 3635 covering 200,000 sheets Paper, Blanks. Bids will be opened 24 November, 1948, at the New York office. Delivery: within 60 days to the Navy Recruiting Bureau.

Invitation No. 3680 covering 30,000 sets Containers, Pads and Liners, Fibreboard. Bids will be opened 24 November, 1948, at the New York Office. Delivery: December, January and February, 1949, to the Naval Clothing Depot, Brooklyn, N. Y.

Invitation No. 3593 covering 379,500 sheets Paper, Index Bristol, various sizes and colors. Bids will be opened 23 November, 1948, at the New York office. Delivery: Various—45-60 days.

### Army Award Made

Award has been made by the New York Quartermaster Purchasing Office, 111 East 16th street, New York City, on QM-30-280-49-340 covering 775,000 Bags, paper, to: International Paper Co., 220 East 42nd street, New York City, 775,000 ea. @ $.0645.

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*A reproduction of this incident from the fabulous life of Paul Bunyan—the thirty-sixth of a series—will be sent on request. It will contain no advertising.*

# Abstracts: TAPPI Mechanical Pulping Conference

*J. N. Bardsley*
Reading Mr. Andrews' Paper

### Zinc Hydrosulphite Treatment of Groundwood

**I. H. ANDREWS**
Powell River Co. Ltd.

Brightening of groundwood by zinc hydrosulphite is a Pacific Coast development used mainly in connection with the manufacture of newsprint. A hot process developed by the technical staff of the Powell River Company Limited is the one in general use.

The hot process employs zinc hydrosulphite for a treatment period that is governed by the temperature and amount of treatment. The pulp is washed following its retention to control the period and to obviate subsequent corrosion.

An unique high capacity groundwood washer is described. The procedures for treatment of groundwood for newsprint and that for papers requiring a greater brightness is outlined. Values of brightness improvement are given for various treatment rates and temperatures, of groundwood from various Pacific Coast woods.

The method of manufacture of zinc hydrosulphite is outlined.

### Wood: Its Preparation and Measurement

**J. B. JONES**
Ontario Paper Co., Ltd.

The more common methods of wood preparation as they are known in the East and particularly the methods in use at the plants of The Ontario Paper Company Limited are described. A flow sheet of the wood room at Thorold as designed to handle both barked and unbarked wood is shown. The various pieces of wood barking equipment are described and illustrated. Explanation is given of the volumetric system of wood measurement, with illustrations, and methods of wood write-off are described. Some comments are made on the importance of wood density in wood purchasing and pulp yield.

*Ralph M. Kingsbury*

### Bleaching Groundwood Pulps with Hypochlorite

**RALPH M. KINGSBURY**
**EARLE S. LEWIS**
**and**
**FORREST A. SIMONDS**
Forest Products Laboratory
Forest Service
U. S. Dept. of Agriculture

The possibility of using calcium hypochlorite for bleaching groundwood pulps was approached by a study of the principal controlling variables and the application of selected conditions of treatment to numerous hardwood and softwood groundwood pulps. It appears that favorable results with hypochlorite depend chiefly upon slowing the rate of reaction, especially during the first few moments. Control of reaction rate by suitable adjustment of temperature, density, and alkalinity is discussed by means of specific examples. The influence of bleaching on shrinkage, freeness, and strength is likewise illustrated. Information is reported on the brightness and strength of mixtures of an unbleached softwood pulp and a bleached mixed hardwood pulp.

Hardwood pulps respond well to 10 percent available chlorine as hypochlorite but softwood pulps do not. However, pulps bleached with hypochlorite are yellowish and the brightness tends to recede appreciably.

### Trends in Mechanical Pulping Operations

**HENRY J. PERRY**
Frederic C. Clark Associates

This paper will cover the following points: (1) Shortage of preferred wood species; (2) Cost of operation; (3) Replacement costs, obsolescence; (4) Present state of equipment and operations (taken from TAPPI survey); and (5) Future possibilities which much be considered.

### Refining of Rejects

**C. T. ROBINSON**
Consolidated Paper Corp., Ltd.

The paper represents the information obtained by submitting a short questionnaire to operators of varied equipment for refining groundwood tailings.

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No attempt has been made by the writer to provide conclusions or recommendations; rather such observations as appear from the data are presented to promote discussion of the various refining systems. Where conclusions and recommendations do appear, they are those of the operators.

Because information on all popular makes of refining equipment was not available in time to prepare this paper, some necessarily have been omitted with regret. It is hoped that operators of such equipment are present at this meeting and take part in the discussion.

*R. B. Martin*

### Control of Slime in Groundwood Mills

**R. B. MARTIN**
**and**
**N. S. CHAMBERLIN**
Wallace & Tiernan Co., Inc.

The causes and effects of slime development are discussed in particular reference to groundwood mill operation with some comparisons made with other types of pulps and papers. Common sources of slime infection are reviewed along with the usual methods for determining importance of the source of infection and the necessary corrective treatments. Particular reference is made to the use of breakpoint chlorination in the preparation of an ideal mill fresh water supply, and the resulting influence on quality of finished groundwood papers, such as those used for food packing.

Some attention is paid to the physical arrangement or mechanical details of the groundwood system and the plea is made for correction of faulty construction in an effort to minimize product and quality losses. Recirculated white water systems are discussed, and the merits of the various bactericidal and fungicidal treatments are considered in keeping with the use requirements of the finished product.

### Instrumentation of the Groundwood Pulping Process

**J. N. FRANKLIN**
Bowater's Newfoundland Pulp & Paper Mills Ltd.

In discussing instrumentation the whole process must be considered and each step analysed.

In the groundwood pulping process, uniformity from start to finish is required. Instrumentation should give as precise a picture as possible of the achievement of such uniformity and serve to control wherever possible.

First consideration is given to the operator. Upon the ease with which he can measure and the speed with which he can react to correct faulty measurement depends the success of the whole venture.

This paper attempts to show present, and possible future, uses of instrumentation at each step of the process. It points out what must be accomplished by such instrumentation in order that this equipment be not just justifiable but strictly essential to efficient operation.

### Use of the Roberts Grinder for Manufacturing Different Grades of Groundwood

**ROBERT MAGRUDER**
St. Regis Paper Co.

A short description and the construction features of the Roberts grinder are given.

A series of tests were run on commercially operating Roberts grinders to determine the operational characteristics for this type of grinder. The effect of stone surface age, power input (grinding pressure), grinding temperature, and burrs used on the dependent variables of production, power consumption, fiber classification, and strength are discussed. The application of this information for the manufacture of several grades of groundwood pulp is demonstrated. (Motion picture.)

*Axel Hyttinen*

### Grinding of Hardwoods: Experiments on Eastern Cottonwood, Yellow-Poplar, Sugar Maple, Black Tupelo, Paper Birch, Sweetgum.

**AXEL HYTTINEN**
**and**
**E. R. SCHAFER**
Forest Products Laboratory
Forest Service
U. S. Dept. of Agriculture

The grinding characteristics of cottonwood and yellow poplar were similar and pulps were produced which, although short-fibered, were comparable in strength with average-quality commercial newsprint groundwood pulp. Black tupelo and sugar maple yielded pulps of fair strength but those from sweetgum, white ash, and paper birch were low in strength. The color of black tupelo, yellow poplar, and white ash pulps was good. that of cottonwood and paper birch fair. and of sweetgum and sugar maple, dark.

The pretreatment of paper birch and sweetgum with neutral sodium sulphite decreased energy consumption in grinding, increased the freeness and fiber length of the pulp, and for the paper birch, increased the strength of the pulp without affecting the color.

The strengths of groundwood book paper for machine coating containing the hardwood groundwoods were 80 to 95 percent (except sweetgum which was about 55 percent) of that of paper made from a comparable furnish in which southern pine groundwood was substituted for the hardwood groundwood. The papers containing black tupelo, yellow poplar, and white ash groundwoods were about equal to that containing southern pine groundwood in color but the papers containing the other hardwood groundwoods were considerably darker. The bursting and tensile strengths and color of toweling papers containing paper birch groundwood substituted wholly or in part for spruce groundwood were about equal to those containing spruce groundwood alone.

# CHEMICAL USERS' GUIDE To General Chemical Products for the Paper Industry

| PRODUCT | AVAILABLE FORMS | COMMERCIAL STRENGTH (MIN.) | SHIPPING CONTAINERS | APPLICATIONS |
|---|---|---|---|---|
| **Aluminum Sulfate** $Al_2(SO_4)_3 \cdot 14H_2O$ approx. *(Alum)* | Commercial & Iron Free: Lump, Ground Powdered | 17.25% $Al_2O_3$ | Bags Bulk Carloads | Precipitation of rosin size and filler; water clarification; manufacture of satin white; pitch control; mordant for dyes. |
| **Aluminum Sulfate** $Al_2(SO_4)_3$ + water *(Liquid Alum)* | Liquid | 32° Be (total $Al_2O_3$ 7.2%) | Tank Trucks Tank Cars | Same as commercial dry product but lower strength. |
| **Salt Cake** $Na_2SO_4$ *(Sodium Sulfate)* | White or Grayish Granules | 95-99% $Na_2SO_4$ | Bags Bulk Carloads | Used in kraft cooking liquors as the source of $Na_2S$. |
| **Glauber's Salt, Crystal** $Na_2SO_4 \cdot 10H_2O$ *(Sodium Sulfate)* | Colorless Crystals | 96% $Na_2SO_4 \cdot 10H_2O$ (42.3% $Na_2SO_4$) | Bags Barrels | Substitute for salt cake in kraft cooking liquor. |
| **Glauber's Salt, Anhydrous** $Na_2SO_4$ *(Sodium Sulfate)* | White Granules | 99.5% $Na_2SO_4$ | Bags Bulk Carloads | Same as Crystal but stronger product. |
| **Sulfuric Acid** $H_2SO_4$ | Liquid | 66° (93.19%), 99% 20% oleum and higher strengths | Carboys Steel Drums Tank Trucks Tank Cars | Wire scouring; parchmentizing; acid wash in last stage of multi-stage pulp bleaching; neutralizing tall oil soaps. |
| **Sodium Thiosulfate** $Na_2S_2O_3 \cdot 5H_2O$ *(Hypo)* | Colorless Crystals | 99.75% $Na_2S_2O_3 \cdot 5H_2O$ | Bags Fibre Drums | Anti-chlor. |
| **Sodium Sulfite, Anhydrous** $Na_2SO_3$ *("Sulfite")* | White Powder | 98.5% $Na_2SO_3$ | Bags Fibre Drums | Anti-chlor. |
| **Sodium Silicate** $Na_2O \cdot XSiO_2$ + water *(Water Glass)* | Liquid | 38°, 41°, 42° Be; special and higher strengths | Steel Drums Tank Cars Tank Trucks | Adhesive for corrugated and solid fibre board; used in coating mixtures to reduce viscosity and in beater sizing to stiffen paper. |
| **Chromium Potassium Sulfate** $K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$ *(Potash Chrome Alum)* | Red Violet Crystals | 99.5% $K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$ | Fibre Drums | Used in "save-all" or white water systems. |
| **Aqua Ammonia** $NH_4OH$ + water *(Ammonia)* | Colorless Liquid | 26° Be (29.4% $NH_3$) | Carboys Steel Drums Tank Trucks | Used with chlorine to form chloramines for slime control. |
| **Sodium Fluoride** | Powder | 90% NaF 95% NaF | Barrels Fibre Drums | Preservative and stabilizer for starch in coating mixtures. |
| **Tetrasodium Pyrophosphate, Anhydrous** $Na_4P_2O_7$ *(TSPP) (Pyro)* | White Powder | 98% $Na_4P_2O_7$ (Equiv. 52% $P_2O_5$) | Bags | Felt washing; pitch dispersion. |
| **Nitric Acid** $HNO_3$ + water | Liquid | 42° Be 67.2% $HNO_3$ | Carboys Drums Tank Trucks | Nitrating pulp; cleaning monel metal. |
| **Sodium Sulfide** $Na_2S$ + water | Red Chips or Solid Mass | 60% $Na_2S$ | Steel Drums | Substitute for salt cake in modified soda process. |

**OTHER PRODUCTS: Hydrochloric Acid; Sodium Metasilicate; Trisodium Phosphate; Copper Sulfate; Disodium Phosphate.**

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In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

## Microorganism Control in Mechanical Pulp and Its Relation to Paper Manufacture

**STANLEY J. BUCKMAN**
Buckman Laboratories, Inc.

As pulp leaves the stone in hot grinding operations it is sterile or at the most contains very few living microorganisms. However, it is infected early in the process primarily by white water carrying living microorganisms which were originally introduced into the system from the fresh water and the air. The amount of infection carried by the white water is influenced predominantly by the temperatures maintained.

The losses caused by the growth of microorganisms in hot grinding pulp operations alone usually are a minor part of the total which ultimately result from the production and use of heavily infected mechanical pulp in the manufacture of paper. Some reduction in screen and decker capacity may be observed. The additional cost of cleaning slime deposits from mechanical pulp systems at frequent intervals also may assume appreciable proportions in some cases. However, the more substantial losses in the pulp mills are limited to those mills which store wet sheet or lap pulp for periods of several months or more and ship it such distances that freight becomes a significant item. In the case of these mills, the greater incidence of decay in pulp produced at temperatures above 50° C. has made it impractical to operate at these temperatures and obtain the advantage of increased water removal by the Kamyr machines with a resultant saving in shipping costs. The increased use of fresh water to maintain lower temperatures and the parallel increase in fiber loss which has frequently occurred also are factors which cannot be completely neglected. Moreover, deterioration of pulp quality by the growth of molds, blue staining fungi, and decay organisms may make it necessary to degrade part of the pulp produced at lower temperatures prior to shipment, upon arrival at destination, or after a conventional storage period at the paper mill.

Information is presented in support of the conclusion that the growth of microorganisms in wet mechanical pulp (50 percent moisture content) can be economically controlled for a storage period of 1 year or more by treatment with a 10 percent solution of phenylmercuric acetate. The treatment was added to the white water with the system closed so that very little white water was discharged. Slime control was achieved throughout the pulp system by the combined effect of the treatment and operation at a temperature of about 55°C. Other advantages of operation at higher temperatures thus were realized with no sacrifice in pulp quality.

The importance of microorganism control in mechanical pulp from the standpoint of the losses caused by slime in paper machine operations is emphasized particularly from the standpoint of pulp stored as slush stock in storage tanks, as wet sheet or lap stock. The loss of fiber in badly decayed pulp, the difficulty of dispersing partially decayed pulp, and odor as well as darkening in color caused by the growth of microorganisms are all factors which cannot be ignored. However, the major losses result from the contribution of the infection in the pulp to the growth of slime throughout the paper machine systems. The primary general classes of losses caused by slime in paper machine operations are: lost production time; decreased equipment performance; loss of heat, fiber, water and various chemicals; decreased equipment life, particularly felts; and loss of finished product.

## Manufacture of Different Grades of Groundwood with Three Pocket Grinders

**C. IVES GEHRING**
Oswego Falls Corp.

The manufacture of groundwood to be used in the production of paper and paper board varying from facial, toilet, and wrapping tissue to heavy weight cylinder board specialties is described.

Grinding is a one system operation for all grades of pulp. Quality and uniformity are based on the use of a group of relatively small capacity grinders all standardized in stone character, type of burr, and temperature. Slight changes in pressure and a well controlled burring cycle meeting changes in wood character.

Sliver removal is followed by selective screening and subsequent blending of the primary grades producing a pulp of the required character.

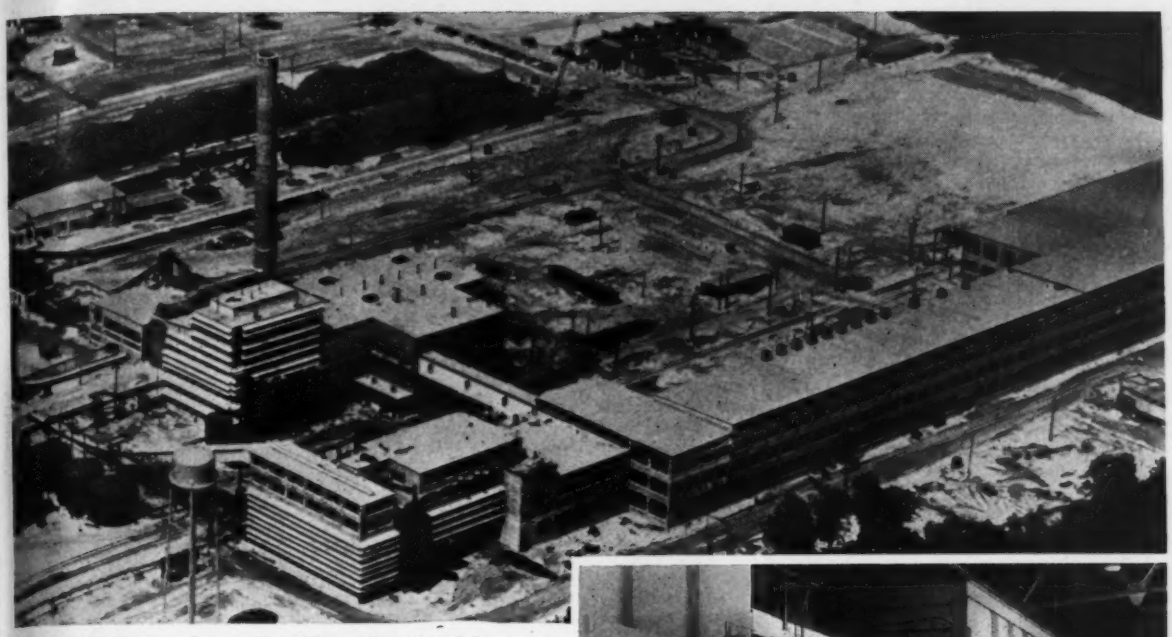
*J. S. Reichert*

## Peroxide Bleaching of Groundwood: Recent Developments and Commercial Status

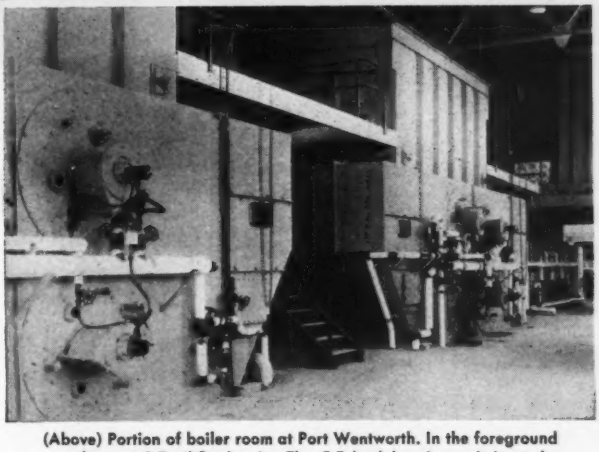
**J. S. REICHERT**
**and**
**R. H. PETE**
E. I. du Pont de Nemours & Co.

The peroxide process for bleaching groundwood is now in commercial operation on an extensive scale. Paper mill operations have shown that bleached groundwood can be used with technical and economic advantages in the manufacture of a wide range of papers, such as book, magazine, catalog, directory, board liner, tissue and towelling, mimeo, tablet, and a number of specialty papers. With groundwood at a higher brightness level it is possible to include a substantial percentage of groundwood in a paper furnish and still maintain a satisfactory paper brightness, along with good formation, bulk, opacity and printing properties.

This paper presents a comprehensive summary of the peroxide process for bleaching groundwood. It gives a history of the process and includes a description of such factors as (a) the chemistry of peroxide bleaching, (b) equipment for groundwood bleaching, (c) operation of the bleaching process, (d) variables in the bleaching process, (e) applications of the bleached pulp, and (f) a bibliography of pertinent lit-



(Above) Air view of new mill. Building at left of stack houses two C-E Recovery Units. Building at right of stack houses C-E bark-burning boiler and two C-E oil-fired boilers (Type VU).



(Above) Portion of boiler room at Port Wentworth. In the foreground are the two C-E oil-fired units. The C-E bark-burning unit is at the extreme right background.

# ALL Steam Requirements at Port Wentworth Supplied by C-E Units

Now receiving the well deserved attention of the entire pulp and paper industry is the new modern kraft mill of Southern Paperboard Corporation at Port Wentworth, Georgia. Here is the first pulp and paper mill in the South designed from the start to run combined hardwood and softwood pulping operations.

The record of the mill since its opening several months ago indicates the complete success of this enterprise. It has averaged four hundred tons a day and has at times produced as high as five hundred. C-E is proud of the important part it has played in this history making kraft mill, having provided not only the Recovery Units, but ALL the steam generating equipment.

The Combustion Engineering equipment comprises two Recovery Units, one VU Steam Generator with Hofft Furnace for bark burning, and two oil-fired VU Steam Generators (arranged for future use of coal) for power purposes. All operate at 625 psi and 700 F. The bark-burning VU has a maximum continuous capacity of 96,500 lb of steam per hr and the two power units 120,000 lb of steam per hr each. Each of the two Recovery Units is designed to burn 635,000 pounds of black liquor solids per 24 hours.

More and more mills are turning to C-E for both new installations and expansion of existing ones. The choice of C-E by Southern Paperboard Corp. is another impressive example of the wide acceptance of Combustion Engineering equipment in this exacting field.

B-273

**COMBUSTION ENGINEERING**

200 MADISON AVENUE • NEW YORK 16, N. Y.

C-E PRODUCTS FOR THE PAPER INDUSTRY INCLUDE STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT, ALSO MANY TYPES OF PRESSURE VESSELS

erature and patent references.

Peroxide bleaching of groundwood in mixtures with sulphite pulps is likewise in successful commercial operation. A description of the process for bleaching mixtures of groundwood and sulphite pulps is therefore included in this paper.

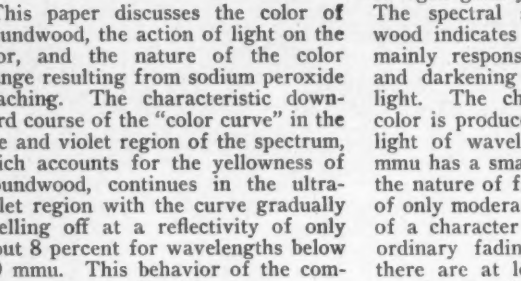
### Nature of the Color Changes in Groundwood

**J. A. VAN DEN AKKER**
**H. F. LEWIS**
**G. W. JONES**
**and**
**M. A. BUCHANAN**
Institute of Paper Chemistry

This paper discusses the color of groundwood, the action of light on the color, and the nature of the color change resulting from sodium peroxide bleaching. The characteristic downward course of the "color curve" in the blue and violet region of the spectrum, which accounts for the yellowness of groundwood, continues in the ultraviolet region with the curve gradually levelling off at a reflectivity of only about 8 percent for wavelengths below 280 mmu. This behavior of the complete spectral reflectivity curve, coupled with the known spectral absorption of lignin, suggests that lignin is primarily responsible for the yellowish color of groundwood pulp. The change in color produced by light, which is most effectively measured in technical studies through brightness (papermakers), is strongly nonlinear with time of exposure, the rate of change being very great for short exposure. The influence of the groundwood content in mixed furnishes, both on the color and color changes, is disproportionately large for small groundwood content. The pH of the furnish is very important, the optimum value with regard to high brightness before and after fading being about 4.0. Oxygen plays only a minor role in the primary reactions of fading. Moisture content has a small but definite effect. Temperature alone causes only inappreciable darkening of color, but elevation of temperature during exposure to light greatly increases the fading. The spectral sensitivity of groundwood indicates strongly that lignin is mainly responsible for the yellowing and darkening of color produced by light. The characteristic change of color is produced by ultra-violet light; light of wavelength longer than 480 mmu has a small bleaching action, and the nature of fading produced by light of only moderately short wavelength is of a character different from that of ordinary fading by ultraviolet light; there are at least two photochemical reactions involved in fading of groundwood. It seems probable that one of the effects of ultraviolet light is to disrupt certain linkages in the materials of the pulp which permits subsequent oxidation. Long exposures of groundwood to sunlight and the radiation from a Fade-Ometer arc produce changes in the measurable chemical characteristics of the pulp. These changes support the view that lignin is responsible for the fading effect, although the state of chemical knowledge is not sufficiently well advanced to permit definite conclusions on the relationship between the color changes and the chemical changes. Recent work on the effect of sodium peroxide bleaching on groundwood quite definitely indicates that the bleaching is mainly of the total lignin in the pulp; that the bleaching action on that portion of the lignin which is extractable (native lignin) is the same as that on the total lignin; and that, in spite of large consumption of the peroxide by the nonlignin components, virtually none of the observed bleaching action is attruitable to the nonlignin components.

### Hickman Broadens Scope

CAMBRIDGE, Mass.—Dr. Kenneth C. D. Hickman, inventor of the modern molecular still used for refining heat-sensitive oils, has concluded arrangements by which he will serve the Eastman Kodak Co., Rochester, N. Y., and Arthur D. Little, Inc., of Cambridge, as consultant. At Arthur D. Little, Inc., he will carry out researches in a field of high-vacuum engineering not previously commercially developed and will also be available for general consultation.



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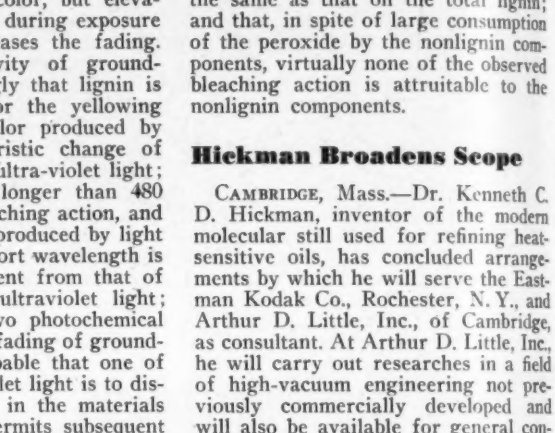


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## Seeking Treble Damages

CHICAGO—The Paper Container Mfg. Co., of this city sued the Dixie Cup Company, Easton, Pa., for treble damages of $5,400,000 on November 12.

The suit contended Dixie violated the anti-trust laws by allegedly monopolizing trade in paper cups, and of patents and machinery for making paper cups.

The plaintiff also alleged that Dixie harassed competitors with expensive and protracted patent litigation to force them out of business.

Other allegations were that Dixie bought up competing companies and competing patent rights, and cut prices on some of its cups for the sole purpose of driving the Paper Container Mfg. Co. out of business.

The bill charged that the Chicago company has lost $1,500,000 as the result of the defendant company's competition and that a patent suit brought against Paper Container by Dixie damaged the complaining company to the extent of $300,000.

The defendant company's patent suit originally charged 14 patent violations. Only one of these charges was upheld in the United States Circuit Court of Appeals, which cut a lower court's award of $2,186,000 to $154,000.

## Golden Safety Trophy

VANCOUVER, B. C.—Initiating a new phase in its continuous Safety Education and Accident Prevention work, British Columbia's pulp and paper industry will introduce annual industry-wide First Aid Competitions early in 1949. Teams from approximately 12 pulp and paper plants will compete for top honours. The winning First Air Team will receive the Industry's highest award, a handsome gold-plated trophy. Each member of the winning five-man team will also receive an individual award, as will members of the second team. The annual trophy award and the team member awards will be made by the Western Branch, Canadian Pulp & Paper Ass'n.

## Rules Hearing Held

WASHINGTON—A hearing on proposed trade practice rules for the fine and wrapping paper distributing industry was held at 10 a. m. on November 16 in Room 332 of the Federal Trade Commission Building, when members of the industry and other interested parties were afforded opportunity to present their views and suggestions concerning the proposed rules. Commissioner Lowell B. Mason presided.

## Yale Wood Use Study

NEW HAVEN, Conn.—The Yale University School of Forestry is completing the first 20 months of a long-term study of wood from tropical forests to determine its adaptability for structural and industrial uses. The first report on the project, which is sponsored by the Office of Naval Research, will cover 25 tree species and will be published early next year.


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Regardless of water temperature, clarity or pH through a wide range, the ALHYDRO unit produces a readily controllable concentration of aluminum hydroxide floc. Moreover, ALHYDRO floc is completely stable . . . if broken up will re-form immediately.

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Since the ALHYDRO unit produces floc by low voltage, d.c. electrolytic decomposition of aluminum plates, it makes 69 lbs. of aluminum treat as much water as nearly ¾ of a ton of ordinary coagulants...greatly minimizes storage problems.

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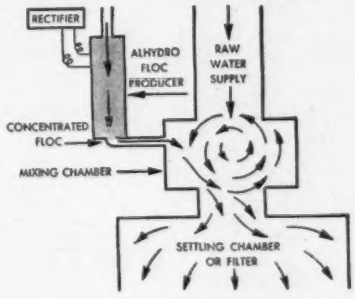
The ALHYDRO FLOC PRODUCER requires a minimum of attention and maintenance. One unit measures only 45″ x 13″ x 34″, and will treat an average of 300,000 gallons of water a day. The ALHYDRO unit may be installed singly or in multiples, in existing or proposed water treatment plants.

**This installation of ALHYDRO FLOC PRODUCER in your water treatment plant will provide you with these advantages—**




- Better water at competitive costs
- Usually eliminates the need for conditioning or correcting water before or after treatment
- Simplicity of operation
- Minimized storage problems
- Easily controlled floc concentration

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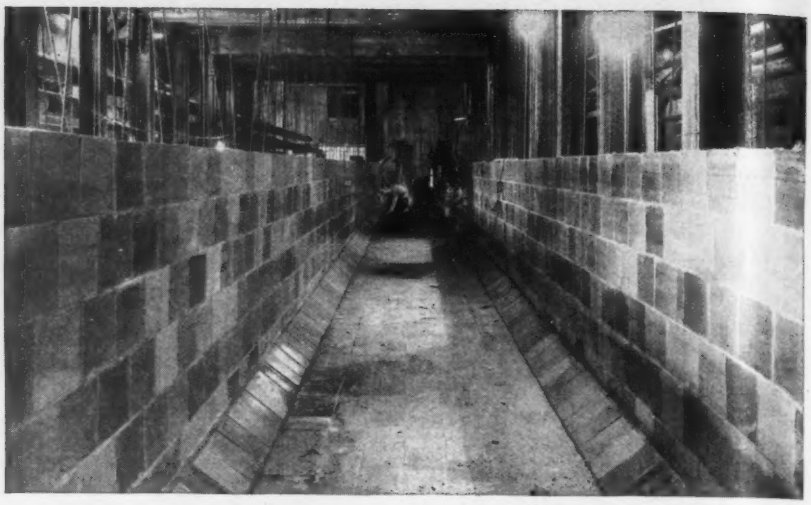

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Inside view of a Tile Chest in course of construction, 78 ft. long, 17 ft. wide and 14 ft. high. Propellor agitator is located at each end.

The slick glazed walls assist agitation in this big chest and it is easier to keep clean as it can be quickly flushed down with a hose.

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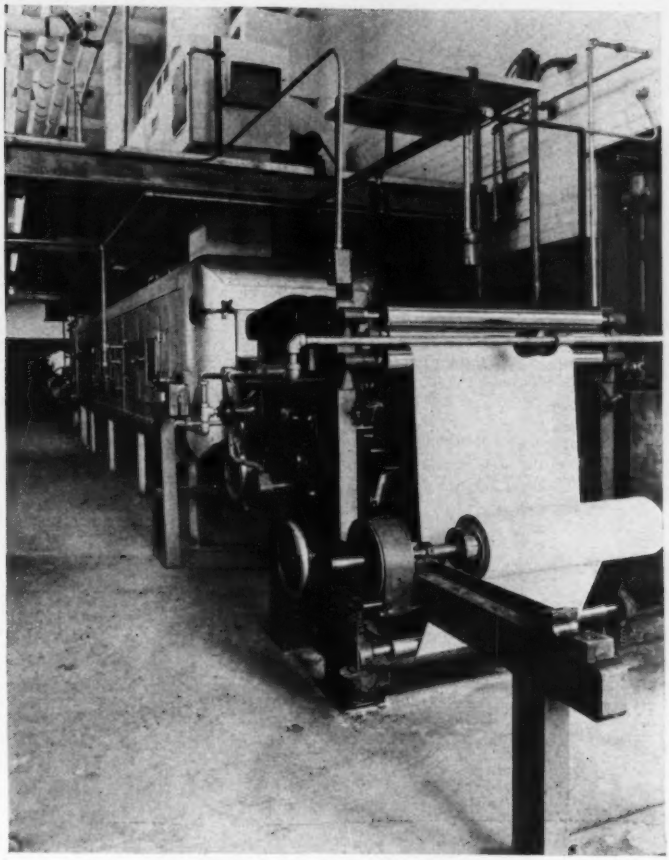

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# Abstracts: TAPPI 3d Engineering Conference

## Measurement of Slush Stock Flows

**G. DOUGLAS ZIMMERMAN**
Fischer & Porter Co.

This paper presents a progress report on the development and performance, to-date, of a stock metering element operating on the variable area principle.

The process and economy of a pulp and paper mill hinge on its flow of slush stock. The methods of metering and controlling these stock flows have changed little in the past forty years. During this time, the industry has used variations of a rotating "compartment" meter—not unlike a water wheel. The theory of this unit's operation is based on volume measurement, each revolution being totalized on a mechanical counter.

In its simplest form the variable area meter is comprised of a tapered metering tube installed in a vertical run of pipe, and a float. The tube has a taper increasing from bottom to top. The sole engineering restriction on the installation of these instruments is that the flow be vertical through this tube. In operation the float rides directly on the flowing stock maintaining a dynamic balance between the effective downward weight of the float and the upward pressure due to fluid velocity. Any change in flow rate tends to alter the velocity pressure and so causes a repositioning of the float in the tube, restoring the balance.

The stock metering elements are fabricated of stainless steel and so designed that they may be installed directly in stock lines by means of standard pipe fittings. They are completely streamlined and pocketless to eliminate seats of slime infection.

The primary elements telemeter the flow rate to remote recording instruments which, in turn, may automatically control, or totalize these flows. Proportioning systems involving two or more flows are simply handled and afford very flexible operation coupled with precise blending. Basis weight instruments in which machine speed and mixed stock feed are interlocked provide the paper machine operators with a degree of control not possible heretofore.

An interesting feature of this instrument's performance still under investigation and development is its inherent consistency compensating tendency. Over fairly wide limits, in the consistency ranges 2.0 to 3.5, these meters provide direct measurement of slush stock flows in tons per day.

## The Paper Mill Engineer Selects a Turbine

**J. C. SPAHR**
Westinghouse Electric Corp.

As fuel costs increase it is more important than ever to select the right turbine for the job. This can be done if the turbine is selected on the basis of a thorough knowledge of the plant requirements. Plant analysis similar to that illustrated is of utmost importance in obtaining a successful turbine installation. Further savings in fuel costs are made possible by the application of feedwater heating cycles. Satisfactory operation on a modern industrial turbine depends almost entirely on the control system. The control system illustrated clearly shows that practically any type of operating requirements can be satisfied automatically by the turbine. The opportunities for reduced plant costs resulting from standardization should be given full consideration. In this connection technical associations such as TAPPI with the assistance of the manufacturers should take the lead in establishing the standards.

## Gas-Fired Infra-red or Radiant Heat Drying

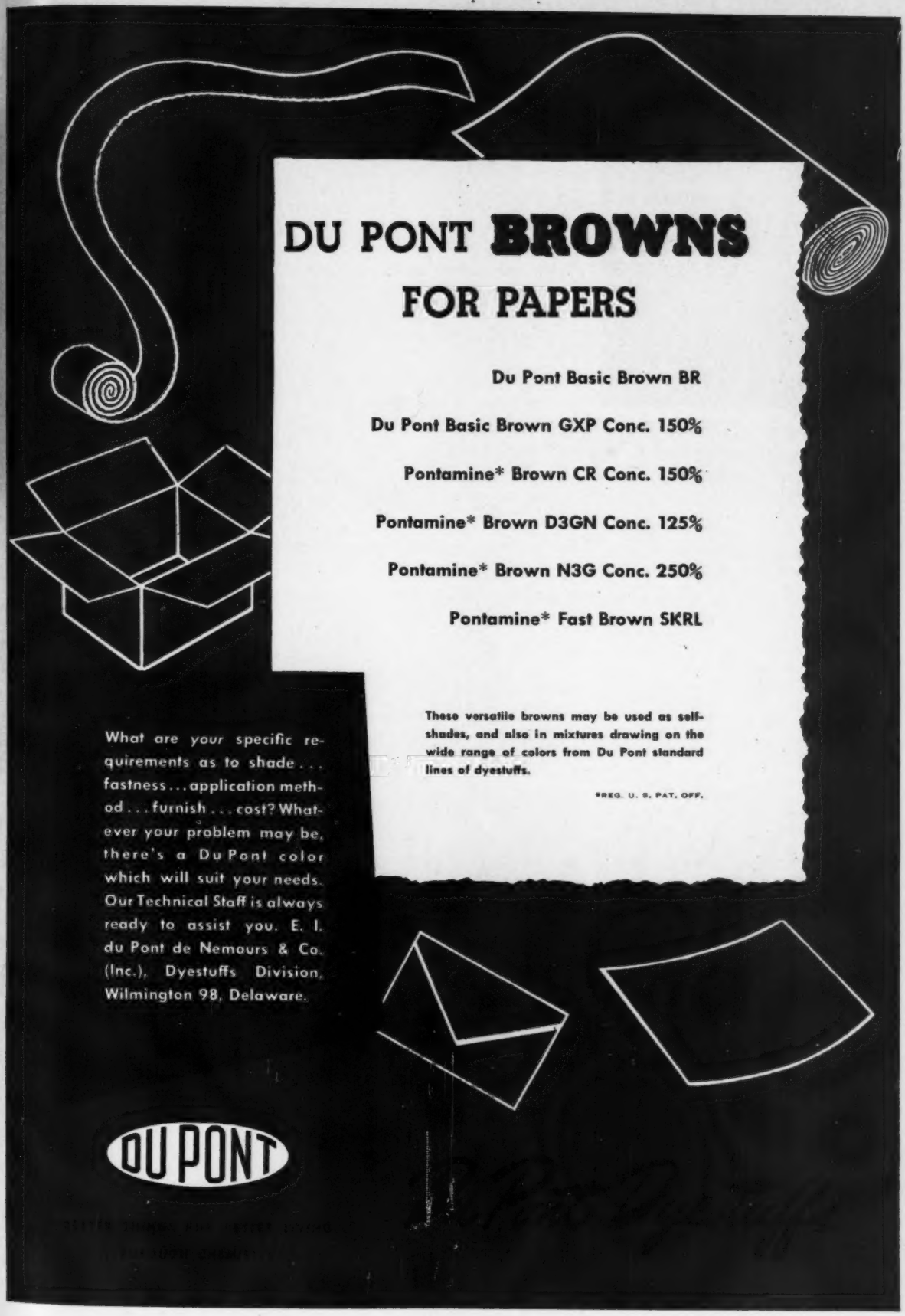
**G. W. GARLAND**
Dudley, Garland, & Jensen, Inc.

Radiant heat from suitable gas-fired units offers a means of increasing the drying capacity of present paper machines with minimum alterations and installation cost. The operating cost is much less than that for heat lamps or induction heating. A properly engineered unit, taking all factors into account, approaches and may eventually equal steam drying in cost.

Infra-red refers to heat in wave form. These waves are generated by a heated body and will travel through air without interruption, but when they reach a solid material which is opaque to the waves, they generate heat upon the surface of the material.

Gas fired burners are made of porous refractories and when the gas and air are properly adjusted, they are practically flameless. Not all the heat is in radiant form; a considerable portion is in the form of heated air and combustion products. The distance between the surface of the paper and burner should be from 3 to 6 inches depending upon the speed of the machine and the moisture content of the paper. The unit can be applied either over or under the sheet. Care must be taken that the paper is not burned. It has been found that, using a radiant burner for the drying of paper, 7000 B.t.u. will evaporate 2 to 2.5 pounds of water. Often results are better. One burner is about equivalent to three and one-half driers.

Radiant heaters have been used primarily to accelerate drying, being installed at the wet end of the machine, however, it is possible to utilize them for complete drying.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### Tests of Flow Spreader Models

**F. M. SANGER**
Pusey & Jones Corp.

Model tests of the Pusey Jones flow spreader have proved that stock is delivered by the flow spreader at uniform velocities across its full width and without cross currents or eddies. These tests, however, did show the desirability of delivering the stock from the flow spreader to the headbox or slice at lower velocities and the flowspreader was redesigned to permit spreading and increasing velocity in each pass and suddenly decreasing velocity in the turn arounds. Thus the viscosity is spread and squeezed, then suddenly decreased successively.

Sudden decrease of velocity results in violent turbulence and thorough mixing at each turn around and this turbulance is smoothed out in the pass following the turn around. The result is that stock is discharged from the flow spreader at about one-half its original velocity. Whenever velocity is suddenly decreased the energy loss is converted to turbulance. Hence, it is essentian that the decrease in velocity when stock flows to an open headbox. be kept as low as possible or it will be impossible to smooth out the flow to the slice to a degree where it will produce acceptable formation.

Delivering the flow of a closed nozzle or pressure slice where velocity is continuously increased to the velocity of the jet onto the wire, eliminates any possibility of turbulence occurring, but to accomplish this it is essential that the flow to the slice be of the proper pattern.

### Drying of Low Density Fiber Boards in Roller Driers

**ARTHUR S. HOLDEN, JR.**

The process of fiber board manufacture includes the steps of refining, forming, pressing, wet cutting and trimming, drying, dry trimming, and packaging or further manufacture. Wood fiber is most commonly used as a base, although any long, strong fiber can be used. Disks and stones or a combination may be used to prepare the fibers. Drum type and fourdrinier type board formers are in successful use today. Press sections consisting of pairs of rolls of increasing diameters reduce the moisture content to 60 percent or even 50 percent in some cases. The pressed mat must be cut into sheets before feeding into a multiple deck roller drier. This operation is now completely automatic.

Roller driers were first extensively used for drying veneer. These required double rolls and the origin of the fibre board drier of today using only single rolls may be directly traced back to this machine. Increasingly heavy structural traming and greater accessibility are distinct features found in driers today. Special ball and graphic bearings have been developed for use in fiber board driers. Steam, gas, and indirect heating may be used depending upon the fuel available in any given location.

As the board is heated, vapor pressure and capillary action contribute to remove the moisture. Proper zoning to most effectively apply heat and air circulation is important in designing a good drier. Extensive laboratory testing is the only safe means of obtaining necessary data to design a drier for any given product. More and more hardboard is being manufactured from the mats first dried in a roller drier in the same manner as low density board. Synthetic resins and other materials in addition to wood appear to have possibilities for use in low density board.

### Electric Cables for the Pulp and Paper Industry

**FRANCIS V. CALVERT**
General Electric Co.

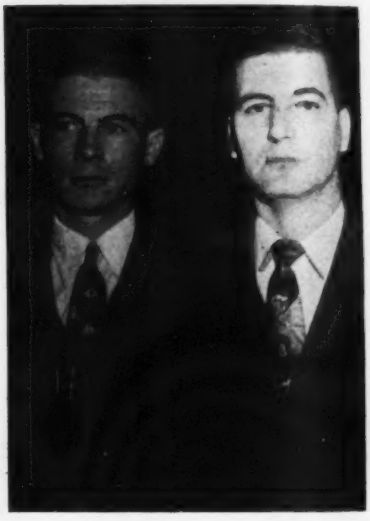
To select the proper electrical cables to give the maximum in safe, economical distribution of large blocks of power, the following points should be considered: Voltage levels, special conditions, developments in cables, and arrangement of feeders.

Based on installed cost, a 4160-volt system is more economical than a 13,800-volt system for mill capacities up to about 10,000 kva. In the range 10,000 to 20,000 they are comparable, above 20,000 the latter is the logical selection. Standard cables can be obtained for the various system voltages.

Generally a radial distribution system is the most economical and affords sufficient system reliability for both low- and high-voltage feeders. The low-voltage system is most likely to require other variations.

Special conditions which must be considered involve corrosion and moisture, heating of cables, voltage drop, short circuit capacity of cables.

Recommendations are given by the author for proper cable selection.



### Ways and Means of Treating Water for Steam Boilers and Process Use in Paper Mills

**W. H. WEITZEL**
**and**
**D. B. JONES**
Hall Laboratories, Inc.

This discussion of treatment of water for paper mill use is divided into two parts. One division covers those uses involving change of phase where water is converted into steam in the power house, and steam is condensed into water in the condensate system. The second division covers those uses not involving change of phase which are associated with the actual manufacturing processes.

Factors influencing selection of ultimate treating requirements relative to the finished manufactured product as well as the boiler feed water make-up needs, have been considered.

Since the generation of steam from water results in a concentration of impurities in the boiler water, power plant feed water requirements usually demand water of a higher quality than does plant process water requirements.

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Some of the factors that affect the quality of boiler feed water and problems associated with feed water impurities are discussed and specific examples cited.

Process requirements, while not demanding a water of low hardness, do demand reasonable clarity, minimum discoloration, and a low corrosion potential. Methods of preventing objectionable deposits caused by the hardness producing minerals upon heating, or under high pH conditions are cited.

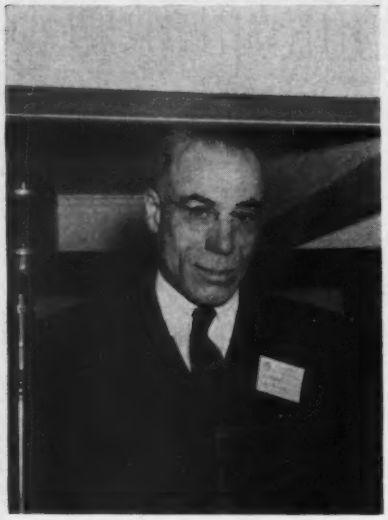
### Centralized Transportation System for a Pulp and Paper Mill

**G. L. HAWKINS**
Hammermill Paper Co.

Electric trucks and a centralized transportation control can be used to advantage in the pulp and paper industry, but as to whether or not they can be used successfully, depends to a large degree on the design and layout of the plant. Consideration must be given to the condition of the floors, widths of aisles and doorways, distances, building locations, types of materials handled, etc.

The type and design of the transporting unit is dependent on the service to which it is to be applied. Considerable savings in labor can be effected; citing the experiences of his company the author indicated a saving of about 40 percent in direct labor for warehousing and shipping operations.

Because of the large number of trucks in use, it was considered advisable to set up a transportation system at the author's mill, which is charged with the maintenance and distribution of all carying units. This permits adequate servicing of all departments since trucks can be assigned to those points where their use is essential. Otherwise, there may be locations in which equipment is idle while, in others, the need for it is urgent.



### Relationship of Top Management and Engineering in the Field of Paper Manufacturing

**A. N. BALL**
E. B. Eddy Co.

To attain maximum efficiency in the development of a plant construction or process project, it is essential that top management and the engineering department work together very closely. Each has its responsibility one to the other.

Management and sales inaugurate the basic development with the advice of engineering as to the feasibility of the project. The engineering department must draw up the plans considering possible alternatives in the event that it becomes necessary to deviate from the original, and submit them to management for approval. Careful consideration must be given to the sequence of the development so that the efficiency of the production will not be impaired to too great an extent. It is essential that the top management be kept informed at all times of the progress of the work so that it can effectively control the project.

The engineering department should also be a source of trained personnel for the operating department, recognizing the fact that if capable men are to be held within an organization, they must be assured of promotion.

### Recent Developments in the Use of Fly Ash and Boiler Slag

**L. JOHN MINNICK**
G. & W. H. Corson, Inc.

A joint research program with a group of fly ash producers over the last few years has resulted in the development of several new uses for fly ash and boiler slag and has further extended the use of these materials in concrete and in bituminous compositions.

Considerable variation exists between various types of fly ash and boiler slag as produced in different sections of the country. These variations are related to both the chemical and physical properties of the materials, such as the carbon content, the amount of soluble salts, pH, the puzzolanic effect, and particle size.

Ceramic compositions have received considerable attention and first class face brick have been made using fly ash and slag in about equal amounts by weight with a small amount (1 to 2%) of binder. The product made from these materials is quite similar in appearance to a high grade shale brick and may be manufactured in the same equipment used for shale and clay products. The characteristics of the brick are excellent and many tests show it to be at least equal to the brick in common use.

The use of fly ash with surface clays has also been studied and the problems heretofore experienced, particularly with respect to the scumming of these brick, have been overcome. For many surface clay plants fly ash may be used in amounts up to 70% for weight.

With respect to portland cement compositions it is becoming more evident that fly ash should be used in larger amounts than heretofore in order to utilize both its ability to act as a fine filler and its puzzolanic property. Experiments in the laboratory and field show that when fly ash is used in proper amounts, the water requirement in concrete can be brought to a minimum and even the early (7-day) strength is thereby increased.

Numerous other fields are being actively studied for the use of fly ash and boiler slag, some of which are already consuming fair amounts of these materials.

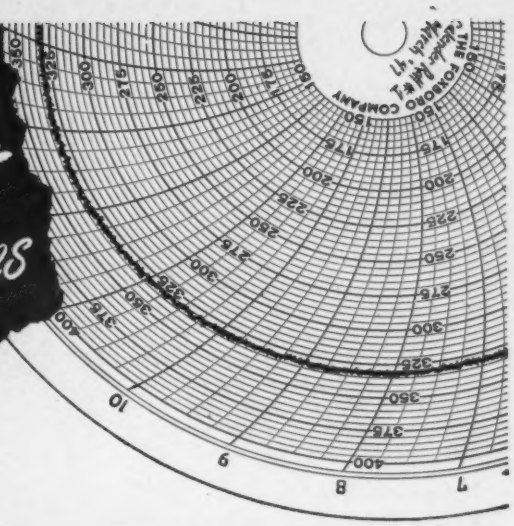
*Johan Richter*

### Continuous Cooking of Kraft Pulp

**JOHAN RICHTER**
and
**A. B. KAMYR**

A. B. Kamyr started working on the problem in 1938, and a pilot plant for 8 tons per 24 hours was put in operation

# Now! Continuous Measurement of Roll Surface Temperatures



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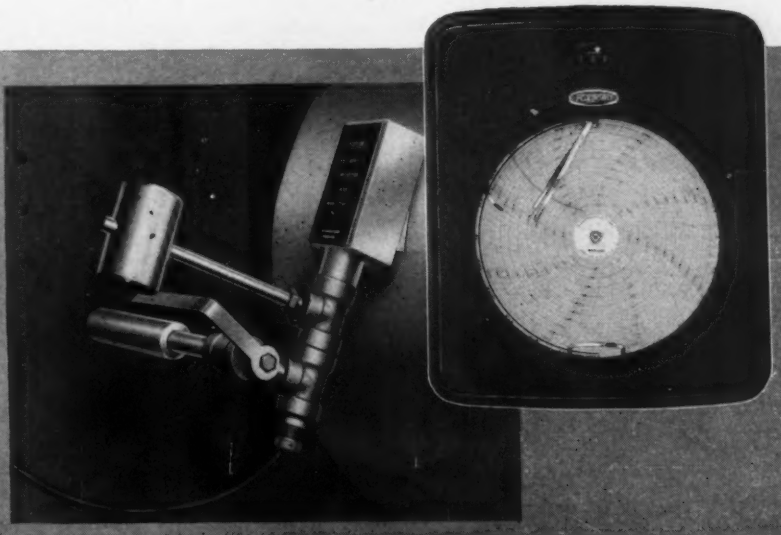
**AN ENTIRELY NEW** type of measuring head coupled with the sensitive, instantly-responding Dynalog Electronic Recorder solves a tricky problem of long standing. This combination has proven far more accurate—and convenient—in the continuous measurement of roll surface temperature than previous devices.

The Foxboro measuring element is very rugged, yet it bears so lightly (only 0.75 gm per sq. cm.) that it avoids any tendency to mark or score the roll. Errors due to friction, radiation, and convection, so common to conventional roll surface temperature bulbs, are completely avoided. Errors and inconveniences arising from use of hand-held surface pyrometers are eliminated. Recorder may be located up to 1000 feet away, connected with electric cable.

Using either a Dynalog Recorder or Controller, this is the system to install wherever closer, continuous measurement or control of roll surface temperatures means a saving in steam, a reduction in waste, a more uniform product. Get complete details—Bulletin 405. **The Foxboro Company, 114 Neponset Avenue, Foxboro, Mass., U. S. A.**



**Foxboro Dynalog Controller at far right. Installation photo shows New Sensitive Element—basically, a miniature resistance bulb having highest sustained accuracy of any temperature measuring element within its range. Accuracy of readings is protected by complete isolation of element from ambient and radiant temperature effects. High speed response to roll surface temperature changes. Operating range: —40°F. to +350°F. or higher under special conditions.**

FOXBORO
REG. U. S. PAT. OFF.

RECORDING · CONTROLLING · INDICATING
INSTRUMENTS

in 1940. This first plant was rebuilt three times, each time along completely new lines. In 1944,, the actual system had been worked out but it was not until 1946 that the mechanical problems were solved which permitted continuous operation of the plant.

The results obtained was satisfactory enough to encourage the planning of a 30-ton plant for Sweden, which will be running in 1949, two more 30-ton plants are in order for France, and one 60-ton for Italy. Several more with a maximum output of 100 tons per unit are under preparation.

The process is, after years of errors, back on the classic system for successful digestion: steaming of the chips with evacuation of gases—impregnation with the cooking liquor—heating—digestion—and finally blowing. Ample time must be allowed for all these stages.

Raw material and liquor must pass through the digester together in such a way that the liquor is exhausted the moment the raw material is digested. There must be no drainage of liquor towards the outlet as this would ruin quality as well as economy.

The chips must not be exposed to rough handling such as plunger or screw feeding in which case the fiber strength will be irreparably impaired. This fact came near ending the whole experiment, and it took years to find a satisfactory way of feeding the chips. For the same reason, the material passes by gravity through a cylindrical digester.

One more problem was the creation of a nonclogging circulation system for heating (direct or indirect). This has been successfully carried through and the strainers of the pilot plant have been in operation for years effectively without cleaning or maintenance of any kind.

A number of advantages which had not been anticipated at the beginning resulted from the work with the pilot plant. The quality of the product, the economy of the process, and the initial installation cost compare favorably with the actual batch system, and the operation has proved extremely flexible reducing man-power to a minimum.

The story of the pilot plant is retraced giving experiences regarding the system as well as the mechanical parts. Strength tests of the pulp produced give a good idea of the gradual development of the system. Illustrations are shown of the principal parts of the pilot plant as well as the full size units designed and actually being built.

In addition to the shop work on four new installations for continuous cooking of kraft in sizes from 30 to 60 tons per hour, a new pilot plant for continuous extraction of tanning is to be installed in France. This pilot plant is built on a system which was originally developed for continuous prehydrolysis of chips in connection with rayon. The chips pass upwards through the digester and are easily removed on top. The same system may be used for any pretreatment leaving the chips physically unaltered.

The plant adapted to contiuous cooking of sulphate kraft will readily produce semi-pulp provided that the digestion has been carried far enough to permit defibration and blowing of the pulp, as is the case when the resulting yield is in the neighborhood of 60 to 70 percent.

**Methods of Wood Handling in the Wood Yard**

**JOHN A. WILLARD**
Bigelow, Kent & Willard

This paper deals with the problems of wood handling and the part that mechanization can play in them. It points out that if mill managements wish to get their costs down they should concern themselves with such matters as trucking costs, delays in unloading in the wood yard and methods of measuring wood. The author, from his observations of wood handling operations in Sweden a year ago, reports that forest management in that country is highly developed, though their handling of the wood in the woods is inferior to our own. Much smaller trees are cut there than we would find it economic to cut. In the United States, the handling and rehandling of wood is one of the most important factors in excessive yard handling costs. Advance planning, to permit the wood to be handled only once, is recommended as a means of reducing these costs. Trucking costs can be excessive too and it is suggested that the mill management familiarize itself with the proper methods of figuring them. Really adequate methods of unloading wood at the mill yard have not yet been developed in most yards. Nevertheless, suggestions are made for reducing costs here. A clever unloading device used in Sweden, though not in this country, is described. Different types of unloading equipment are enumerated and their advantages explained. It is urged that this equipment be selected carefully, with full knowledge beforehand of the operating costs. A comparison of costs is made between methods of mechanical handling and hand labor. Before deciding on handling facilities for the wood yard a number of items are listed that should be considered. Conveyors for handling wood are discussed, as well as the alternative methods, with the maintenance costs of each. The fact that there is as yet no ideal method of peeling wood is gone into, with remarks on the different barking systems available. A suggestion is offered for storing wood in the form of chips. The need for predetermining operating costs is emphasized and a cost formula included for guidance.

## Sherman Bag Machine

UPPER NEWTON FALLS, Mass.—A new type of large paper bag similar to those formerly made by hand is being manufactured on a new machine just completed by Sherman Paper Products. Paul Thompson, sales promotion manager discloses.

The machine manufactures flat-type bags with sealed bottoms and ends by a high-speed continuous process.

Chief feature of the machine is an accordion-pleating operation, which will produce bags up to 60 inches high, and up to 24 feet in circumference, delivered in a folded form six inches wide. Another innovation includes special methods of sealing and cutting.

Patent applications are pending on various features of the bag, the machine, and the method of operation, Mr. Thompson added.

## Conn. Supt's Elect

SPRINGFIELD, Mass.—Andrew H. Gilmore, superintendent of the C. H. Norton Co., of North Westchester, Conn., was elected chairman of the Connecticut Valley Division of the American Pulp & Paper Mill Superintendents' Ass'n., at the annual meeting held at the Hotel Sheraton here. Other officers selected. were: Vice-chairman, Thomas Flaherty of the Case & Risley Paper Co., Oneco, Conn., and second vice-chairman, Alfred Montagna of the Southworth Co., West Springfield.

Robert McGinley of the Dilts Machine Works of Fulton, N. Y., explained the results of test and practical runs made on his firm's latest machines handling fiber for paper-making.

## Dickinson to Ontario

OTTAWA—The John Dickinson Co., of England, manufacturer of paper products, has entered the Canadian field, locating a temporary plant in Hamilton, Ont., where it will later erect its main industry.

## Cenmarco Receiver

JERSEY. CITY, N. J.—August W. Heckman was named receiver of the Cenmarco Corp., paper products manufacturer, 142 Logan avenue, on November 11.

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***MEMPHIS 8, TENNESSEE***

# Western New York TAPPIs Visit Du Pont's Tonawanda Rayon Plant

TONAWANDA, N. Y.—Approximately 50 members of the Western New York Group, TAPPI, were treated on November 10 to an excellent lesson in technical process control, as guests of the DuPont Co. in a tour of the rayon plant on River Road.

At the dinner meeting, which followed the plant tour, members and guests listened to an excellent talk by Dr. E. F. Wesp, technical superintendent of the rayon plant, on various phases of the rayon industry. Dr. Wesp cited the growth of the rayon industry which, he said, has advanced in 56 years from the test tube stage to an annual production of almost one and one-half billion pounds, and sets the pace for other synthetic fibres. He predicted continued growth, stating that the trend in textiles is toward development of specific synthetic fibres for specific needs.

The meeting was conducted by G. H. Rand, Jr., of the International Paper Co., Niagara Falls, N. Y., who gave a short preview of coming meetings, and extended the thanks of the group to the DuPont officials for their excellent handling of the plant tour.

Ralph Prince, secretary-treasurer of the Empire State Section of TAPPI, was among those present, and gave a report on the current membership drive in the local groups.

## Power Potential Boost

BOSTON—New England paper manufacturers—long advocates of increased efforts to boost power potential in this six-state area—received a boost to their plans on November 9, when the Federal Power Commission's legal advisers recommended that the New York State Power Authority be licensed to construct its share of the proposed $463,000,000 St. Lawrence power project.

## Dardenne Visiting U. S.

CARTHAGE, N. Y.—Marcel Dardenne of Lessmer, Belgium, arrived in Carthage recently to study the machinery and processes used in the paper mills of this area. Mr. Dardenne is assistant technical engineer for the Denaeyer Co., in Willebroek. The Belgian plant is a Taggart Corp. sulphite plant which manufactures glassine, grease-proof and Kraft paper.

## 50 Years of Food Trays

ST. JOSEPH, Mich.—The nation's first paper food tray was introduced 50 years ago by Mullen Brothers, now the St. Joe Mullen Container Corp. The product was an immediate success—so great that the factory was unable to meet the fast-growing demand despite day and night production of 500,000 trays every 24 hours.

## Warren Rayonier Director

NEW YORK—George E. Warren has been elected a director of Rayonier Inc. Mr. Warren is a director of Remington Rand, Inc., Virginia-Carolina Chemical Co., Wallace & Tiernan Corp., Home Title Insurance Co., and is a trustee of Columbia University and Tuskegee Institute.

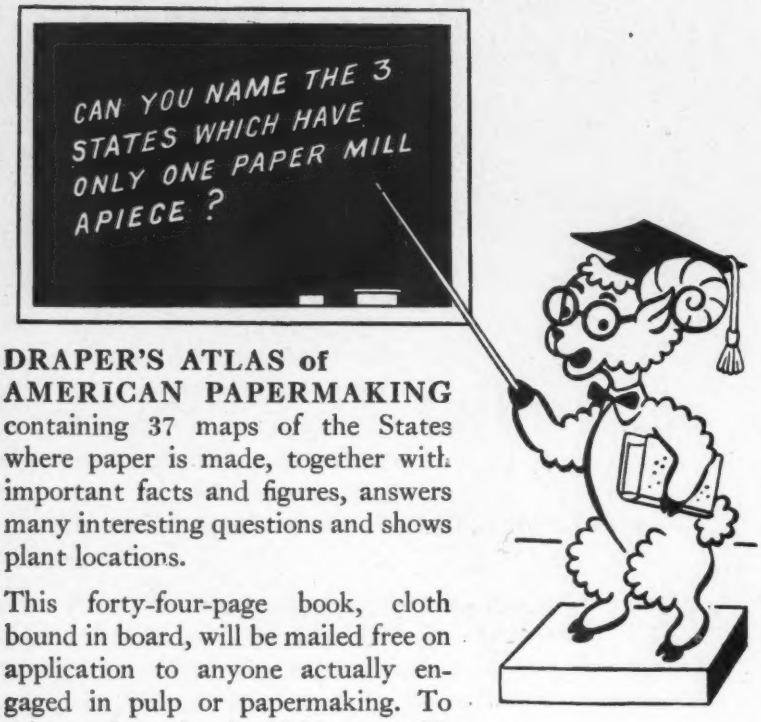
## $500,000 Warehouse

SAN FRANCISCO, Calif. — Pacific Coast Paper Co., is erecting a $500,000 warehouse on Seventeenth street, extending from Texas to Mississippi streets, to have a frontage of 200 feet and a depth of 225 feet. Pacific Coast Paper is a division of the Butler Co., Chicago.

## New Hammermill Address

NEW YORK—The local office of the Hammermill Paper Co. is now in the Chanin building, 122 East 42nd street, telephone, MUrray Hill 9-6424. It was formerly at 50 East 42nd street.


*What do you know about Paper?*




**DRAPER'S ATLAS of AMERICAN PAPERMAKING** containing 37 maps of the States where paper is made, together with important facts and figures, answers many interesting questions and shows plant locations.

This forty-four-page book, cloth bound in board, will be mailed free on application to anyone actually engaged in pulp or papermaking. To others, the price is $2.00 postpaid, while the edition lasts.

The DRAPER Felt

**DRAPER BROTHERS COMPANY**

*Woolen Manufacturers Since 1856*

CANTON, MASSACHUSETTS

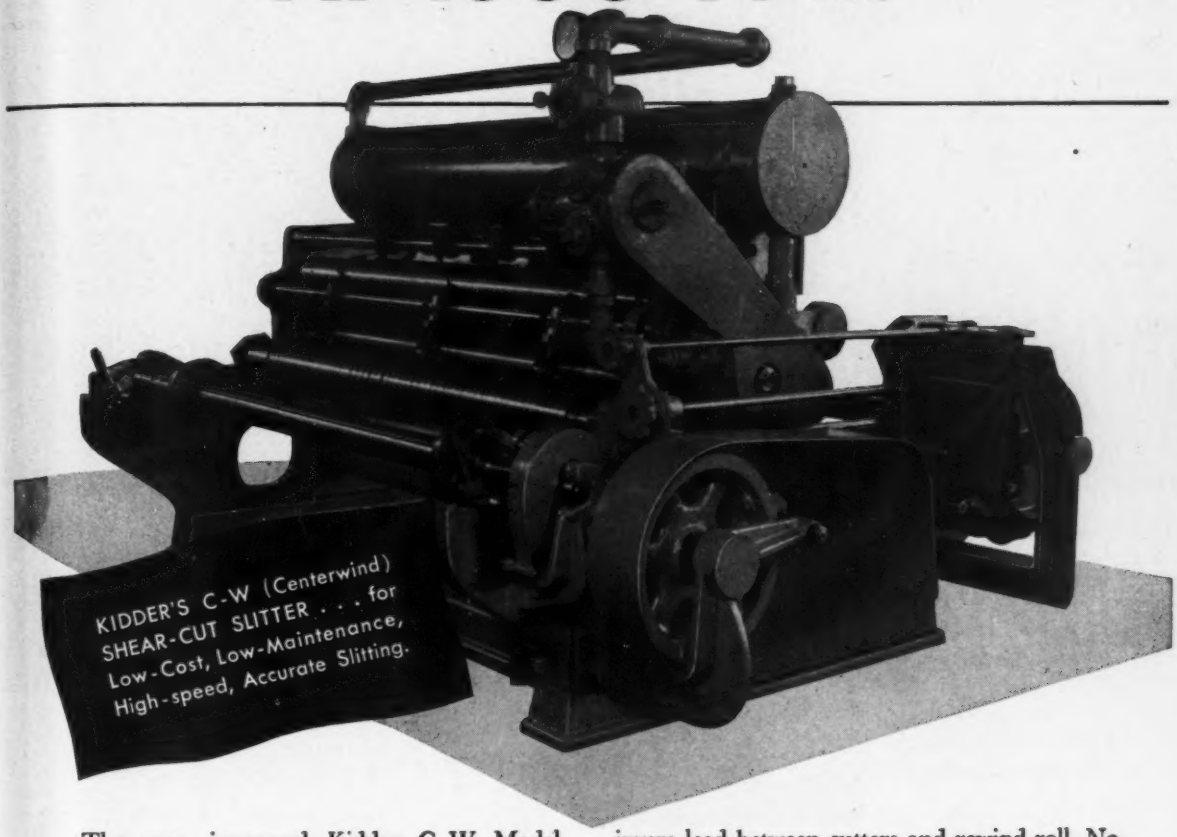
Ralph E. Briggs, Sales Manager

BRADFORD WEST, Pittsfield, Mass. — WILLIAM N. CONNOR, Jr., Canton, Mass. — L. H. BREYFOGLE, Kalamazoo, Mich.

WALTER A. SALMONSON, 519-20 White Bldg., Seattle, Wash. — L. L. GRIFFITHS, Jr., Kalamazoo, Mich.

**Answer to Question No. 11** — Rhode Island, Colorado, Arizona

# Processed Stock Rolls Hum Off AT 1500 FPM




The new, improved Kidder C-W Model Slitter delivers accurately-cut, dustfree rolls of processed stock in widths 2″ or more at 1500 fpm. Rolls are never burred or interwoven . . . they fall apart by themselves. The centerwind principle, without rewind drums, allows slitting of most types of papers from light tissues to heavy-coated tag stocks.

**Automatic Carriage** — a Kidder exclusive — in which the carriage moves backward as the rewind roll grows bigger, assures constant, minimum lead between cutters and rewind roll. No chance for interweaving rolls.

**Automatic Hydraulic Tension Control** — prevents interweaving. Kidder engineers have applied this principle to the C-W model to assure constant web tension. Simply set the desired tension on the dial and it is automatically maintained throughout the run.

**Scissors-Action** — Shear-type cutters, self-sharpening for low maintenance, *cut* the *web* cleanly.

## KIDDER PRESS COMPANY, INC.

**DOVER, NEW HAMPSHIRE**

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Special Representative to Paper Mills on Slitters and Rewinders,
Graybar Building, New York 17, N. Y.

A. E. MARCONETTI
11 W. 42nd St., New York 18, N. Y.

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WHITE WATER HEATING
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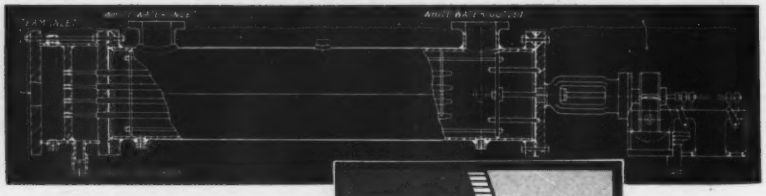
## SELF CLEANING
## WHITE WATER HEATER

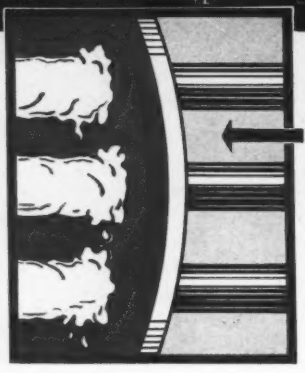
*Specially Designed for the Paper Industry*



**HOW IT WORKS**

The transverse heater baffles, which also serve as tube surface cleaners, are connected by tie rods to the yoke plate, which in turn is connected to the drive mechanism at the right. The time controls close the motor circuit at predetermined intervals. The yoke plate moves each baffle longitudinally along the tubes, until the drive mechanism reverses the action and returns the baffles to their original position.

Available in models for either manual, electric motor or hydraulic piston drive. Automatic types operate on adjustable predetermined time schedules.



BAFFLES MOVE FORWARD AND BACKWARD LEAVING TUBES CLEAN AS A WHISTLE

Patent No. 1826747
Other Patents Applied For

A BATCH OF MANUAL TYPE SELF CLEANING HEAT EXCHANGERS READY FOR SHIPMENT.

**Every Inch of Every Tube Is Thoroughly Cleaned At Every Cycle!**
**100% Heater Capacity Available At All Times!**
**Standby Heating Equipment No Longer Needed!**
**Old Style Heater Cleaning Costs Forever Banished!**

# DAVIS ENGINEERING CORPORATION

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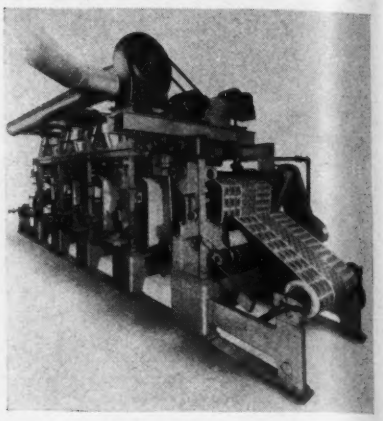
Elizabeth 4, New Jersey
30 Rockefeller Plaza, New York 20


## A. T. F. Buys Klingrose

ELIZABETH, N. J.—Edward G. Williams, president of American Type Founders, Inc., reports that his firm has purchased the Klingrose Machine Corp., Brooklyn, N. Y., and is operating it as the Klingrose Gravure Division, making and selling multicolor web-fed rotogravure presses.



A multicolor web-fed rotogravure press, being manufactured by the new Klingrose Gravure Division of American Type Founders, Inc., Elizabeth, N. J.

"The Klingrose Corp., started building gravure presses in 1936," Mr. Williams states. "Sine then it has been producing both heavy-duty and lighter gravure presses of high craftsmanship and precision for leading paper mills, converters, label and packaging material manufacturers, and others. Several concerns have a score of such presses in their various plants. Presses have been built in units of from one to eight colors, equipped with rotary sheeters with jogger pile delivery, with applicators of gluing, gumming, and plastic coating, and with unwind and rewind accessories."

Acquisition of the Klingrose business includes both plant and personnel, so the division starts as a complete and functioning organization, staffed with men of long experience and skilled in the design, engineering, and manufacture of this type of equipment.

## Falk Coupling Selector

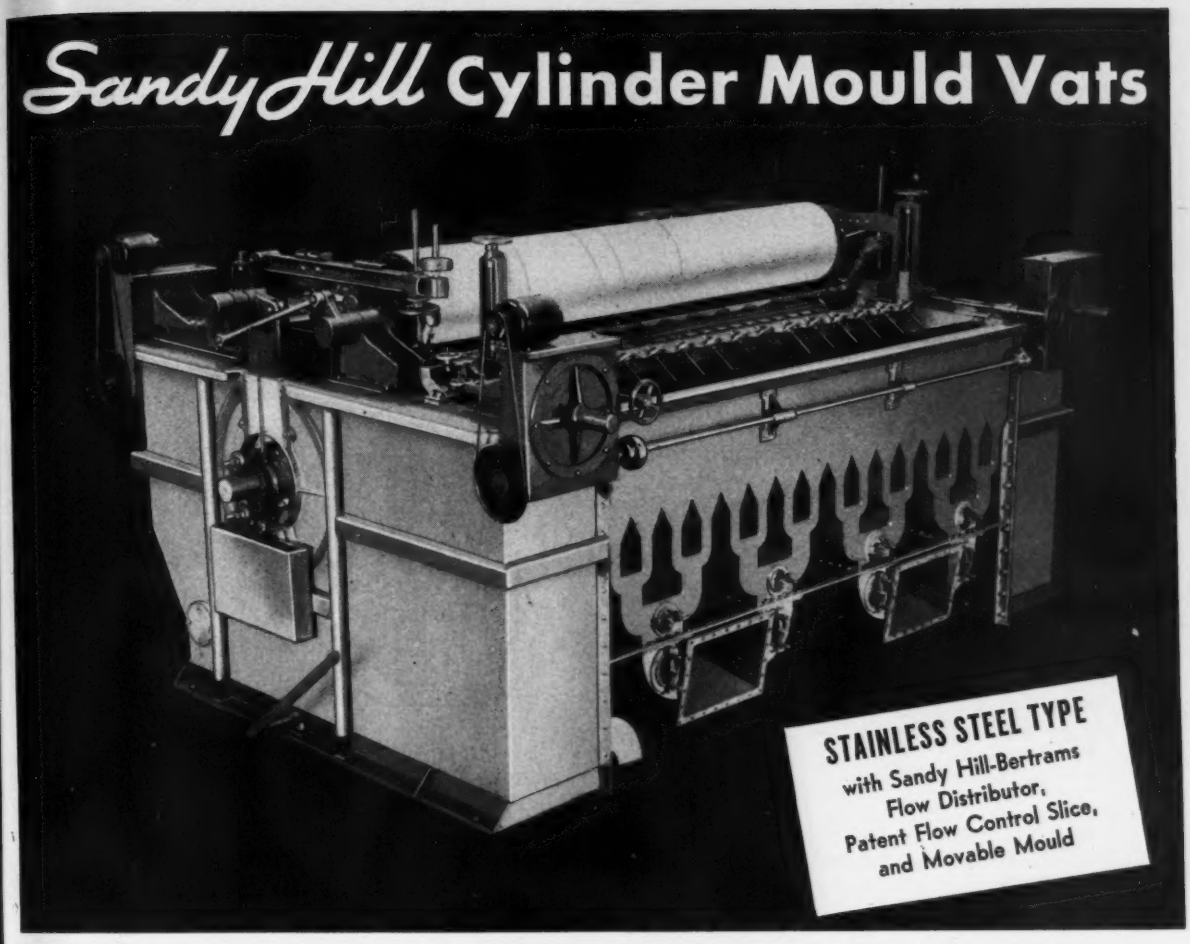
MILWAUKEE—A Steelflex Coupling Selector has been prepared by the Falk Corp. for draftsmen, engineers, designers, plant engineers and others who are instrumental in the selection and purchasing of flexible couplings.

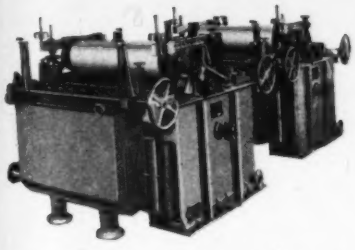
This selector covers couplings from Falk sizes 3F up to size 18F.

## Hall Production Manager

CLEVELAND, Ohio—William J. Hall has been named production manager of the Ivanhoe division of the Reliance Electric & Engineering Co., electric motor manufacturer of this city and Ashtabula.

# Sandy Hill Cylinder Mould Vats



Two of a complete set of four stainless steel vats for a multiple cylinder machine. These have all the features and adjustments described at the right.

## "Not just a mould in a tub, but a precision machine with facilities for getting the most out of a given furnish"

That, in brief, is the appraisal, by a well-known paper-making authority, of the Sandy Hill Cylinder Machine Vat.

Several types are available, each designed and constructed to give the best solution to the problems of distribution of approach flow and maximum opportunity to vary flow through the vat to meet specific formation requirements.

The type illustrated above features:

- Direct flow vat equipped with Sandy Hill-Bertrams Flow Distributor to give even mixture over full width of mould.
- Counter flow vat may also be furnished.
- Special patented design permitting movement of mould 6" both horizontally and vertically while operating.
- Vat is provided with an overflow for recirculation.
- Combination Sandy Hill Slice and Making Board, giving means of controlling the stock as it enters the circle, regulating formation and speed of stock at forming point.

Let us show you how well the proper type will fit into your production scheme.

## Sandy Hill Iron & Brass Works

Hudson Falls, N. Y.

*Machinists and Founders Specializing in Paper and Pulp Mill Machinery*

Manufacturers of
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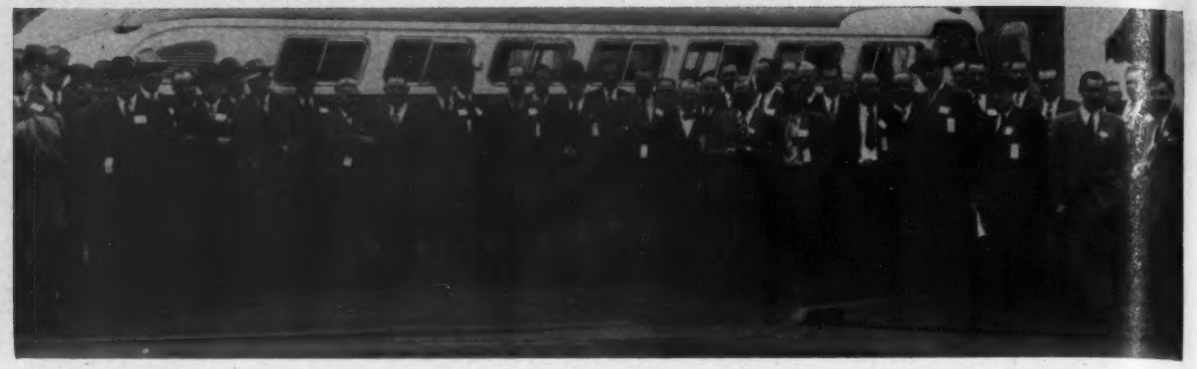
Cylinder Paper Machines
Pulp Grinders
Dandy Roll Drives

Pulpers or Kneaders, Voith
Thickeners
Quick Opening Gate Valves
Bertrams Flow Distributors
Bertrams Shakes

Nelson Slice
Feltless Wet Machines
"Selective" and Corner Drives
Fourdrinier Paper Machines
"Packer" Screens

Castings
Bleaching Equipment
Scofield Felt Conditioners
Cleveland Type Bearings
Shaker Screens



The group of TAPPI enginers who visited the Lockport Felt Co., plant.

# Lockport Felt Co. Host to TAPPI Conventioneers

NEWFANE, N. Y.—The Lockport Felt Co., plant here was visited on October 29 by about 75 engineers, members of TAPPI attending their third national engineering conference at the Hotel Statler in Buffalo.

Lockport officials met the group at the Statler with busses and drove them through scenic Niagara County to the Lockport mill at Newfane.

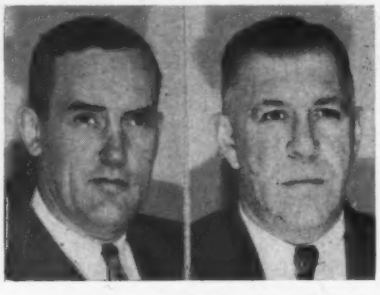
Here they were broken up into small groups, assigned a guide and taken on a tour of inspection of the mill where they observed felt making equipment in operation and new installations planned for the near future.

The engineers manifested special interest in the intricate details involved in the manufacture of felts and particularly complimented the officers on their new addition housing modern fulling mills and washers.

Following the tour, they were driven to the Lockport Town and Country Club where refreshments and luncheon were served. After luncheon, R. J. Lee, executive vice-president of the company, welcomed the guests and expressed appreciation for their taking time off to come to Newfane and learn more about the manufacture of Tenax felts. He then introduced his father, William H. Lee, president of the company, who spoke briefly on the felt manufacturing methods of yesteryear as compared with those of today. Mr. Lee praised the felt manufacturers for their ability and foresight in keeping abreast of the many developments in the paper making industry and pledged Lockport's continued cooperation with paper makers in continued research to improve felt life. "The rule-of-thumb methods of yesterday," said Mr. Lee, "are now replaced by rigid laboratory tests of each operation in the making of a felt. Our engineers," he continued, "work side by side with the paper engineers with the ultimate objective of producing more and better paper at as low a cost as possible."

W. F. Gillespie, president of TAPPI, in turn expressed appreciation to the Lockport officials for their hospitality received.

The busses which had picked the party up in the morning were again on hand for the return to Buffalo. On their way back the group visited the plant of the Upson Co. at Lockport, N. Y.



## WHITING MEN ADVANCED

G. E. Seavoy, vice-president in charge of the process sales Division of the Whiting Corp., Harvey, Ill., is now directing all field sales operations, including advertising, field erection and service; and M. J. Rice, vice-president in charge of the industrial sales division, is directing all of the company's product sales divisions.

### Nopco Appointment

HARRISON, N. J.—William A. McCready will become a member of the Central Area sales force for the Industrial Division of Nopco Chemical Co., on January 1. Prior to this appointment, he spent several years in the company's laboratories. His territory will include Indiana and sections of Ohio and Kentucky where he will work directly under John N. Gammon, district manager.

### B. & W. Boiler Film

NEW YORK—The Babcock & Wilcox Co. has released a 16 millimeter 41-minute educational film, "Steam for Power," which depicts the development and application of modern steam boilers.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MEISEL PRESS MFG. CO. 950 Dorchester Ave., Boston

# Machinery for Plastic Coatings

**By ARTHUR GAIO**

John Waldron Corp., New Brunswick, N. J.

The knowledge and experience acquired during the critical war years in developing protective and decorative coatings has begun to bear results which few of us dreamed possible. Not only new materials, but modifications and improvements in old ones are increasing with such rapidity that it is impossible for a person to keep thoroughly informed or to comprehend their total significance. This rapid advancement has made more pronounced the problem of selecting the coating machine most suitable in applying a particular type of coating.

The following descriptions, together with the illustrations, are designed to facilitate the understanding of the four general types of coaters used for plastics, namely, knife, roll, air and cast coaters.

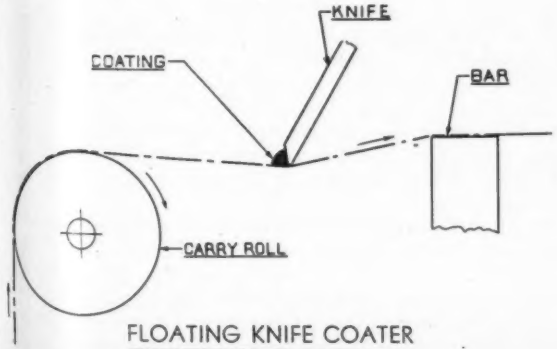
### Knife Coaters

There are three important knife coaters worthy of mention.

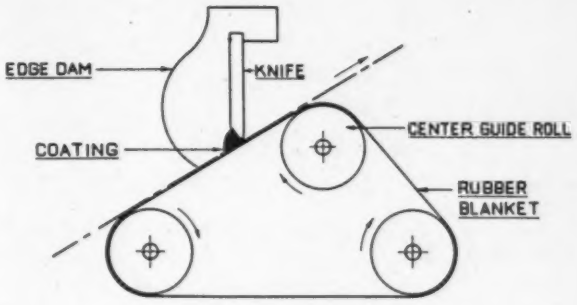
The first of these is a simple coater, frequently called a *floating knife coater*. The coating is applied onto the face of the web, in front of the knife, employing dams or end plates to resist the lateral movement of the coating. Since the knife is supported only by the web, the coater is unable to handle low strength materials. The angle of the knife should be inclined from the vertical in the direction of web travel, since the hydraulic action of the coating would tend to force the coating past the knife or break the web. The tension on the web should be set at the worst condition since the tension will vary considerably during the coating operation. The thickness and quality of the coating applied by this coater is controlled by the angle of the knife, radius of the knife, and tension on the web. Any slack edges and varying caliper are a detriment to uniform coating. This coater finds its greatest usage in the textile field in the application of organisol and vinyl coatings.

Presented before the Plastics Committee at the Institute of Paper Chemistry, Appleton, Wis., August 16-17, 1948.

The John Waldron Corp., reserves the rights to publication of this article.




FLOATING KNIFE COATER



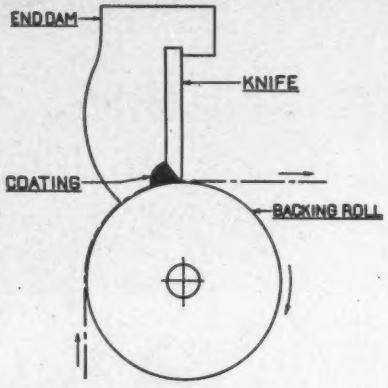

KNIFE COATER

The second or *blanket type knife coater* employs a solid rubber blanket as a carrier for the web and support for the knife. By using a rubber blanket, low strength materials can be coated, since the tension is removed from the web and transferred to the blanket. The fact that the tension is applied to the rubber blanket results in uniform pressure on the web. This factor permits more uniform coating than that obtained on the previously mentioned floating knife coater where all the pressure was applied on the web. Since the rubber blanket exerts a constant pressure on the web against the knife, the coating will be applied uniformly regardless of varying caliper of the web. This pressure can be pre-set and adjusted during operation without changing the tension of the web.

The third or *rubber spreader* employs a knife mounted above a rubber roll. The viscosity of the coating and the density of the rubber roll should be properly proportioned so that the rubber roll is always under pressure. This results in constant and uniform pressure on the web against the knife tending to offset minor inaccuracies in the knife, rubber roll, and the web. If this is accomplished, results may be obtained comparable to those obtained on the blanket coater.

When discussing knife coaters, the design and shape of the knife should be considered since it assists in controlling the quantity and quality of the coating. The larger the radius on the knife, the greater the amount of coating which is applied. Avoiding so called "spitting" can be accomplished by specially designed knives, which have a right angle cut to the radius of the knife. The web should leave tangent to the radius of the knife and perpendicular to the cut in the knife. The angle of the knife should be inclined from the vertical in the direction of web travel.

One great objection to knife coaters in general are the streaks which are caused either by particles becoming lodged under the knife, or the abrasive action of the coating which causes scratches on the knife. By using a highly polished, hard chrome finish on the knife, the




ROLL KNIFE COATER

streaks caused by scratches on the blade can be held to a minimum.

Knife coaters are used principally in the application of high solid content materials, such as vinyls, organisols, rubber, etc., as well as lacquers, varnish and shellac.

**Roll Coaters**

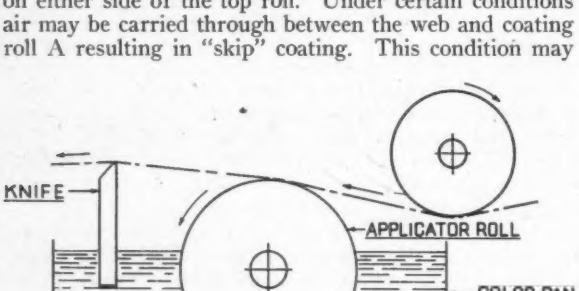
There are many types of roll coaters but only the more important of these will be discussed.

The *doctor kiss coater* is a combination of both the knife and roll coaters. It employs a roll application of the coating in conjunction with a knife that meters and smooths the coating.

This coater finds its greatest success in the application of low solids and low viscosity coatings. It has found widespread use in the application of coatings to embossed or rough materials. Since the coating roll can be rotated in either direction, it applies coating in considerable excess, forcing the coating up into these impressions or irregularities. The knife by means of capillary attraction and gravity permits a uniform coating on these rough surfaces.

The Germans were using this method of application with great success in the manufacture of Condenser paper employing a Nitrocellulose Methyl Acetate coating.

A second type or *roll kiss coater* employs two identical rolls, one rotating in a pan of coating, the other being mounted in a vertical plane directly above. In order to secure better control of the tension, and a greater arc of contact with the coating roll, rolls C and D are placed on either side of the top roll. Under certain conditions air may be carried through between the web and coating roll A resulting in "skip" coating. This condition may be remedied by applying weights on top of the web at roll A or by placing a rubber roll at this position.




DOCTOR KISS COATER

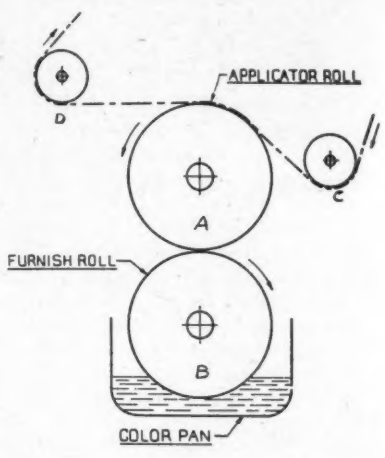
Kiss coating will give uniform coating since the mechanical inaccuracies of the rolls is reduced when the coating film is split twice. The coating as it leaves the nip of rolls A and B splits and splits a second time at the nip where the web leaves the surface of roll A. It is a good method of application if you are coating just one side of the material, since there is no danger of coating the back side of the web.

There are three sources of difficulty to be watched for in this coater; namely, tension, slack edges, and air carrying through between web and roll.

This type coater finds its application in the field of hot melt coatings.

If the above machine is rethreaded so that the web passes between rolls A and B, *one-side pressure coating* can be effected. If the two chilled iron rolls are ground true, the coating will vary as the web varies in caliper. By replacing roll A with a rubber covered roll of the proper density, a more uniform coating can be obtained.

In designing wide roll coaters, large diameter rolls become necessary to avoid possible sag. The large diameter rolls and the surface tension of the coating cause large ribs. These coarse ribs may be reduced to finer ribs by contacting a small diameter roll, such as E, after the coating has been applied. Roll E being of smaller diameter produces finer ribs, since the angle of tangent with web is reduced. Roll E is usually run in a direction and speed best suited for the particular job.




KISS ROLL COATER
GUMMER TYPE

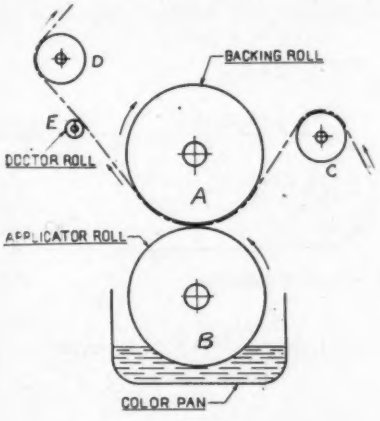
The pressure coater has the danger of applying some coating on the back side of the web. If coating on the back side of the web is not conducive to continued operation, roll A should be a metal roll. A cleaning doctor could then be used on this roll which would assure a clean roll coming in contact with the web at all times. This coater finds application in the fields of wax and hot melt coatings.

By rethreading the above machine so that the web is wrapped about rolls A and B with the addition of a feed pipe, *two-side pressure coating* may be accomplished. This coater has the same advantages of the one side pressure coater. It is, however, more adequately equipped to handle low strength materials, since the pres-

sure rolls and the coating assist in driving the web through the coater. This was not true of the previously described roll coaters. The web could be threaded through rolls A and B providing a strong material is used. Basically, this machine is used as a saturator or impregnator. It is extensively used in the field of phenolic coatings.

One of the more recent developments in the field of roll coaters is the *edgewise coater.* A roll pressure method of application, built on a vertical plane, is used to apply the coating to the web. Either a one side or two side coating may be applied since the coating is pumped to the top of either or both sides of the web and permitted to flow down forming a nip at the rolls. Prior to its development, the coating was applied by means of tower coaters, which depended on a dip and gravity flow method of application. Since the material being coated could not be contacted on either side, the height of the tower or dryer determined the production speed. This was in the neighborhood of from one to three feet per minute. Present day edgewise coaters operate at speeds of 150 feet per minute.

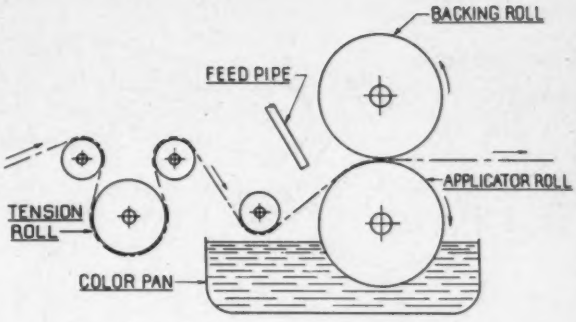
Of the roll coaters, the *reverse roll coater* is the most flexible. The thickness of the coating cast onto the web is governed either by the opening between the doctor and casting rolls or by changing the speed of the casting and doctor rolls in relation to the web speed. This




ONE SIDE ROLL COATER

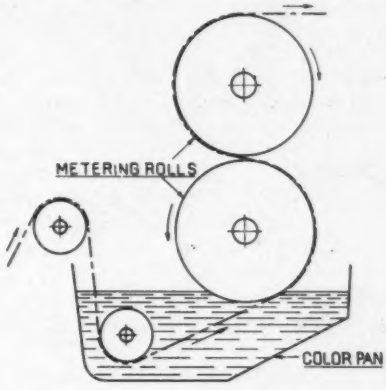
means that the greater the differential between the web and casting roll, the greater the amount of coating that will be cast on the web.

The doctor roll is mounted on micrometrically adjusted bearing blocks, which permits accurate adjustment during the coating operation. The coating is cast on the surface of the web, the web being held against the surface of the casting roll by a resilient synthetic rubber backing roll, which is also micrometrically adjusted for various caliper materials. The various speed ratios and reverse rotation between the doctor and casting rolls minimizes ribbing. The surface tension of the coating will govern the speed ratio between the doctor and casting rolls. This coater is capable of handling low strength materials as readily as the strong materials, since the web is not subjected to material tension or pressure. Since the coater uses a casting principal to apply the coating on the web, the varying caliper of the web does not affect the uniform thickness of coating being applied. It is interesting to note that given a coating




TWO SIDE ROLL COATER

formulation consisting of 50% solids by weight, we could apply say a one thousands dry film on the web by having a two thousands opening between the doctor and casting rolls. A few of the more notable coatings applied by this

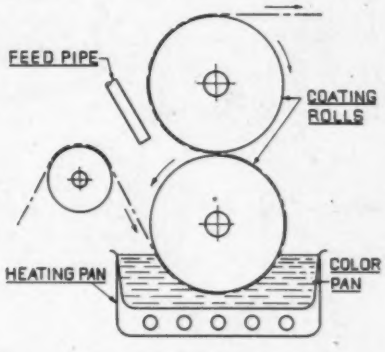



TWO SIDE ROLL COATER
SATURATOR TREATER
SUBMERSION TYPE

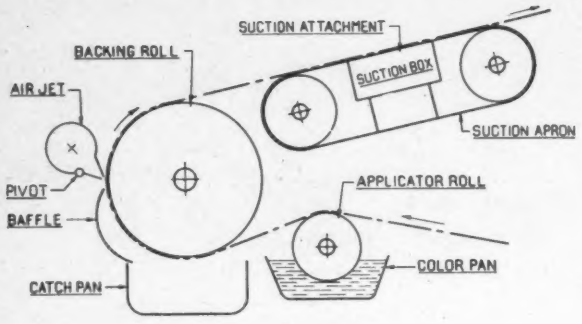
method include organisols, vinyls, lacquers, varnish, and most solvent type coatings.

**Air Knife Coater**

The Microjet or *Air Knife Coater* is a very recent de-

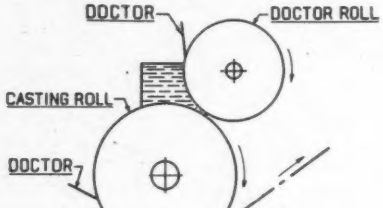



TWO ROLL COATER
SQUEEZE ROLL SATURATOR
OR TREATER



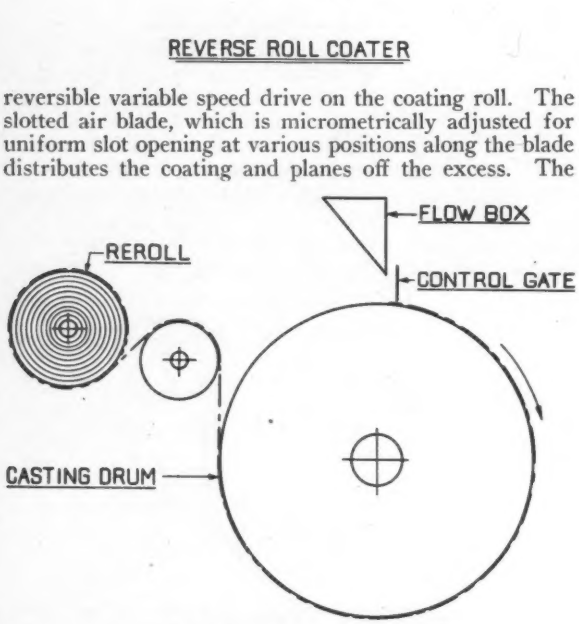

MICROJET COATER

velopment, although the use of air as a metering means was understood and attempted years ago. This is one of the improved practical applications. The coating is applied to the web in a regulated excess by means of a




REVERSE ROLL COATER

reversible variable speed drive on the coating roll. The slotted air blade, which is micrometrically adjusted for uniform slot opening at various positions along the blade distributes the coating and planes off the excess. The




DRUM CASTING MACHINE

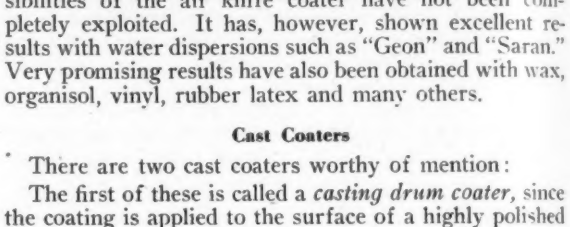
air nozzle is angularly positioned by rotating the nozzle about a pivot line which is located at the slot opening of the nozzle. The slotted nose of the nozzle may be positioned in relation to the backing roll by a horizontal adjustment in order to accommodate the various caliper webs. The amount of coating applied is controlled by the air pressure and utilizing the variable speed of the coating roll to supply a regulated excess of the ultimate weight of coating desired. The minimum weight of coating depends on the absorbency of the sheet, since the coater is capable of blowing off the major portion of the surface coating. The "Microjet" is one of the most versatile coaters, being able to handle a wide range of viscosities. Its simplicity of operation results in low maintenance costs and permits the use of inexperienced operating personnel.

Because of its recent development, the coating possibilities of the air knife coater have not been completely exploited. It has, however, shown excellent results with water dispersions such as "Geon" and "Saran." Very promising results have also been obtained with wax, organisol, vinyl, rubber latex and many others.

**Cast Coaters**

There are two cast coaters worthy of mention:

The first of these is called a *casting drum coater*, since the coating is applied to the surface of a highly polished drum or cylinder. The head or flow box controls the




BELT CASTING MACHINE

amount of material supplied in front of the knife. The flow box is usually under high pressure and temperature. The control gate acts in much the same manner as a knife in metering and leveling the coating on the cylinder. This type machine is usually used in the manufacture of acetate and photographic films.

The second of these coaters is called a *casting belt coater* and employs the use of an endless stainless steel belt as the casting surface. Much the same casting equipment is used as in the previously described cast drum coater. The cast belt coater has wide use in the manufacture of vinyl film. A machine similar to this, with some minor additions, is now in operation producing a fabric laminated to Cellulose Acetate. It consists principally of an oven containing banks of infra-red lamps and a stainless steel belt on which the Cellulose Acetate molding powder is automatically weighed and cast. The acetate powder is preheated to a sufficient temperature by the infra-red lamps. The fabric is introduced at the opposite end of the oven so that steel belt, molten Cellulose Acetate and fabric pass through two pressure rolls, which combine the fabric and acetate. The material is stripped from the belt at the cool end of the oven. This process eliminates the use of solvents and produces a

product, which can be drawn into a variety of shapes, in ordinary hydraulic presses.

When one considers the tremendous technical advancements and the new plastic coatings being made available in ever increasing number, the selection of the proper coater becomes all important. The machines previously described have definite advantages as well as short comings. There is no one type of coater on the market today, which will solve all coating problems. Coaters are designed to handle the particular material being processed.

You must consider the end results desired, the nature and flow characteristics of the coating as well as the economics of the problem. After all, the application of a coating is only a means to an end and any effort expended to understand the relationship which exists between the coating material and the coating process will benefit both producer and consumer.

# Tests of Flow Spreader Models

**By F. M. SANGER**

***Chief Engineer, Pusey & Jones Corp., Wilmington, Del.***

The Pusey and Jones flow spreader, as originally designed, was part of the Stream Flow Vat System. It consisted of a long tapering tube of gradually decreasing volume which continually increased the velocity of the flowing stock. Simultaneously the shape changed from a circular cross-section to a long narrow rectangular cross section, the length corresponding to the width of the vat for which it was designed.

This equipment gave such excellent results that it was decided to try it on Fourdrinier machines. At first it was built into a single compartment, open head box with an adjustable baffle in the pond back of the slice. This arrangement was satisfactory with moderate rates of flow on medium-sized machines. However, application to wide, high speed machines resulted in poor formation and skating on the wire. Vortex areas and cross currents were produced in the pond near the inlet from the flow spreader. Adjusting the baffle did not entirely correct this trouble so it was decided to build a scale model flow spreader and slice and see if conditions could be duplicated in the laboratory.

A scale model of a flow spreader and slice back on a 234" Kraft paper machine was built to 1/5 scale. Sides were made of Lucite so flow could be observed and the unit connected to a 1000 gpm. pump (corresponding to 25,000 gpm on the full size unit). The slice back was built so the angle or taper of the passage from the flow spreader could be varied and pitot tubes were installed to show velocity across the flow spreader discharge and in the tapered back to the slice. Runs were made at varying quantities of flow and pitot tube readings taken across the discharge of the flow spreader and about 2/3 up the tapered passage behind the baffle. The pitot tubes indicating velocity at the flow spreader discharge showed the excellent uniformity of velocity at this point but those indicating velocity in the tapered passage to the slice varied widely and the pattern of flow in the slice back showed the same vortex areas in the pond back of the baffle. Varying the angle of the sliceback had little or no affect except to increase turbulence at the pond surface as the angle was decreased (velocity increased). As the quantity of flow was decreased, the vortex areas diminished and practically disappeared. This indicated a relationship between the velocity at the beginning of the taper to the slice back and the turbulence in the slice back.

An abridged version of a paper read at the Third Engineering Conference of the Pulp and Paper Industry, sponsored by TAPPI, Buffalo, N. Y., October 25-28, 1948.

A flowing liquid possesses kinetic energy and some of this energy is given up when velocity is decreased. The energy given up appears as turbulence or rotary motion and this cannot be converted back to straight line motion but must be dissipated in the form of heat (friction or viscosity). It is evident, therefore, that inlet velocities should be kept as low as practicable to insure a minimum turbulence when this flow is released into an open pond, and our later flow spreaders are designed to spread and squeeze in each pass and increase area suddenly at each turn around.

The resulting velocity at the discharge is roughly half of the inlet velocity instead of 15-25% greater. Increasing the area at the turn arounds provides thorough mixing at these points through the resulting turbulence.

A 1/5 scale model of the new design was built and tested in the same manner as the one described above. Velocities across the discharge were uniform as shown by pitot tube readings and the variations of velocity and turbulence across the slice backs markedly decreased. Complete elimination of turbulence in the slice back is impossible if velocity is decreased but it can be held to a minimum and ironed out by proper design. Velocities can be increased without creating turbulence. Hence, if velocities are continuously increased up to the slice nozzle, turbulence will not start and flow should be uniform and in machine direction across the full width of the area.

A Lucite model of a closed nozzle was built to replace the slice back used in the previous tests. This model was a rectangular passage of full machine width from the flow spreader to the slice tapering in cross sectional area so as to give continuously increasing velocities. The slice lip is adjustable and the entire construction of Lucite. Pitot tube readings were taken at the end of the flow spreader and in the slice nozzle. These showed uniform velocities across the full machine width with a slight reduction at each edge due to edge friction. The sides of each pass of the flow spreader, the turn arounds and the last pass were all of Lucite, as well as the entire slice nozzle. Care was taken to keep passages smooth and fits accurate. The construction is such that complete visibility of the flow pattern is attained. Discharge from the nozzle is into a tank and by regulating the level of water in the tank the amount of entrained air going to the pump suction can be regu-

lated. This entrained air provides minute air bubbles in the flow which makes this pattern of flow in the last pass of the flow spreader and in the slice nozzle plainly visible. Flow was parallel in the machine direction with no evidence of cross currents or eddies. The appearance of the jet leaving the slice nozzle was especially impressive, there being no tendency to break up or spread. Raising the level in the tank and baffling the entrance to the pump suction eliminated all signs of air and the jet in the last pass of the flow spreader and slice nozzle became solid water and completely transparent.

Model tests of the P. J. Flow Spreader have proved that stock is delivered by the flow spreader at uniform velocities across its full width and without cross currents or eddies. These tests, however, did show the desirability of delivering the stock from the flow spreader to the head box or slice at lower velocities and the flow spreader was re-designed to permit spreading and increasing velocity in each pass and suddenly decreasing velocity in the turn arounds. Thus we spread and squeeze, then suddenly decrease velocity successively.

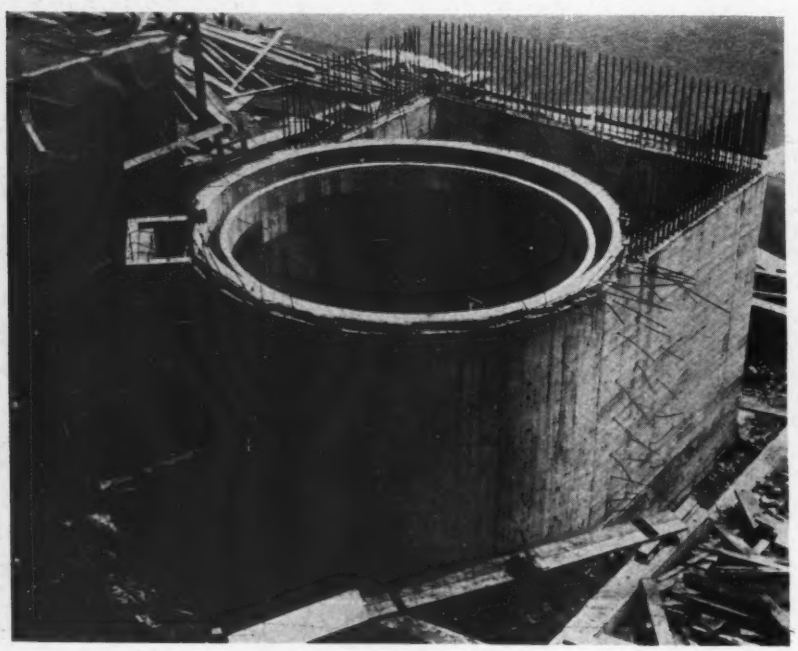
Sudden decrease of velocity results in violent turbulence and thorough mixing at each turn around and this turbulence is smoothed out in the pass following the turn around. The result is that stock is discharged from the flow spreader at about one-half its original velocity. Whenever velocity is suddenly decreased the energy loss is converted to turbulence. Hence, it is essential that the decrease in velocity when stock flows to an open head box, be kept as low as possible or it will be impossible to smooth out the flow to the slice to a degree where it will produce acceptable formation.

Delivering the flow to a closed nozzle or pressure slice where velocity is continuously increased to the velocity of the jet onto the wire, eliminates any possibility of turbulence occuring, but to accomplish this it is essential that the flow to the slice be of the proper pattern.

# New Power Plant and Water Treatment System At Dexter Sulphite Pulp & Paper Co.

**By E. ALAN MAHANNAH, JR.**
**Dexter Sulphite Pulp & Paper Co.**

A new power plant and water treatment system, the first phase of an expansion and construction program started over two years ago by Dexter Sulphite Pulp and Paper Company, has been recently completed and placed in operation at Dexter, N. Y. Located immediately adjacent to the old boiler house, the new power plant is so situated that future expansion may be provided in two directions, parallel to the existing mill proper.



**Accelator building during construction. Reinforcing steel was later bent over for floor reinforcing.**

Briefly, the power plant includes a Babcock and Wilcox integral furnace boiler, Combustion Engineering Raymond Mill pulverizer, forced and induced draft fans, motor and turbine driven feed pumps, an air compressor, coal and ash handling equipment, automatic combustion control, and a General Electric 3500 KW turbo-generator and switchgear equipment.

### Coal Handling

A Jeffrey Manufacturing Company coal handling system, supplied by Syracuse Supply Company, includes a track hopper, with beams and grating; an apron feeder, with variable speed drive; a single roll coal crusher, with by-pass valve; a bucket elevator and a troughing belt conveyor with magnetic pulley for distributing coal to bunkers.

Cars are placed on a newly constructed spur in the mill yard, where they may be unloaded directly into the apron feeder, without interfering with mill traffic operations. The system is controlled by a Westinghouse electric control center, located at the foot of the bucket elevator, adjacent to the coal crusher. This includes starting switches, selector switches, master push button station and time delay relays between major motors, and arranges for sequence starting of the equipment or starting the individual units. The crusher, control equipment and the apron feeder is enclosed in a steel frame gallery, covered with corrugated transite siding. A transite-covered,

windowless housing provides for protection of the conveyor on the roof, which empties into a steel plate bunker in the boiler house. Coal is then gravity fed into a Raymond Mill pulverizer, which prepares the fuel for the boiler. The coal handling system will transfer approximately 50 tons per hour to the 150 ton capacity bunker.

The pulverizer delivers to burners, through connecting piping, a fuel mixture containing pulverized coal and from 15 to 20 per cent of the total air required for combustion. The remainder of the total combustion air is mixed with the primary fuel stream at the burner. The entire mixture is set into a state of intense turbulence, which assures substantially complete combustion of the coal particles.

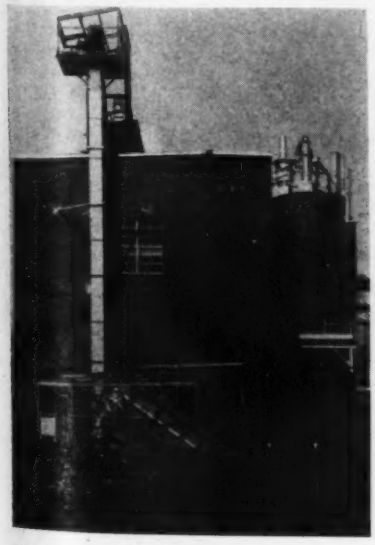
### Oil Burners

Auxiliary Peabody oil burners are provided for starting fires, and can be used for plant operation if desired, particularly at low loads.

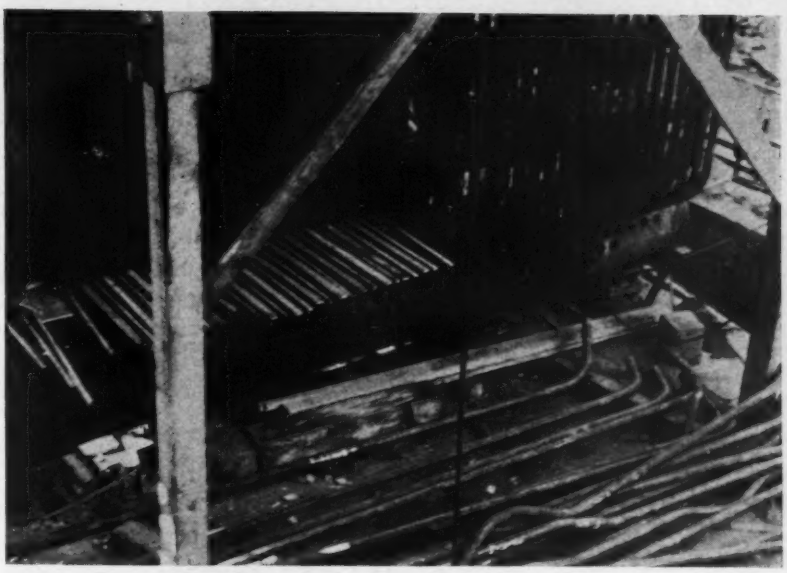
Oil storage is provided in the mill basement by two 9900 gallon tanks. The tanks have been covered with sand and enclosed by a brick wall, which separates them from the heater and pumps. Two Peabody pumps transfer both "Bunker C" and light oil to the boiler, via a pipe line through an underground tunnel which also houses steam, water and electrical lines. Heavy oil, heated to about 90 deg. F., to insure a sufficiently fluid condition for the pumps to handle, is moved at about 15 G.P.M., at 400 psig discharge pressure, while the light oil is pumped to the boiler house at 6 GPM, at 150 psig discharge pressure.

### Ash Handling

A United Conveyor Corporation ash handling system will transfer about 9 tons of dry ash per hour through a 6 inch Nuveyor pneumatic ash and fly ash conveyor to a vitrified glazed tile storage bin. Steam consumption of the conveyor is 220 lbs. per ton of dry ash. A rotary dustless unloader provides for the removal of 1100 cu. ft. of dry ash per hour (i.e., at 45 lbs. per ft., approximately 25 tons of dry ash). Ashes are unloaded into cars which may be moved on the same spur that handles coal cars, to a position directly beneath the ash storage bin. Trucks also may be driven to the same position, in the event that it is not feasible to use RR cars.



Eastern side of new Boiler Plant. Coal-handling system in center, ash storage bin and equipment at right.



Boiler, during construction. Note wooden spacer bars.

### Water Treatment System

The water treatment system, by Infilco Corporation of Chicago, includes a steel-lined concrete accelator, concrete water storage and filter tanks, pumps, three zeolites, and miscellaneous automatic chemical feeders and agitators. The apparatus provides for clarification, filtration, zeolite softening and chemical treatment of the raw water from Black River. A cinder-concrete block building houses the accelator, locker room and lavatory. An enclosed walkway joins the accelator building to a filter room, which houses the pumps, zeolites, storage and filter tanks.

A high pressure, closed feed water heater, containing cupro-nickel tubes, has a capacity of 115,000 lbs. of feed when supplied with 15,900 lbs. of steam water per hour, at 215 to 337 deg. F.,

Two Ingersoll-Rand feed water pumps, one motor driven and one turbine driven, are installed near the Bailey Control panel in front of the boiler. Each pump has a capacity of 280 GPM.

### Boiler

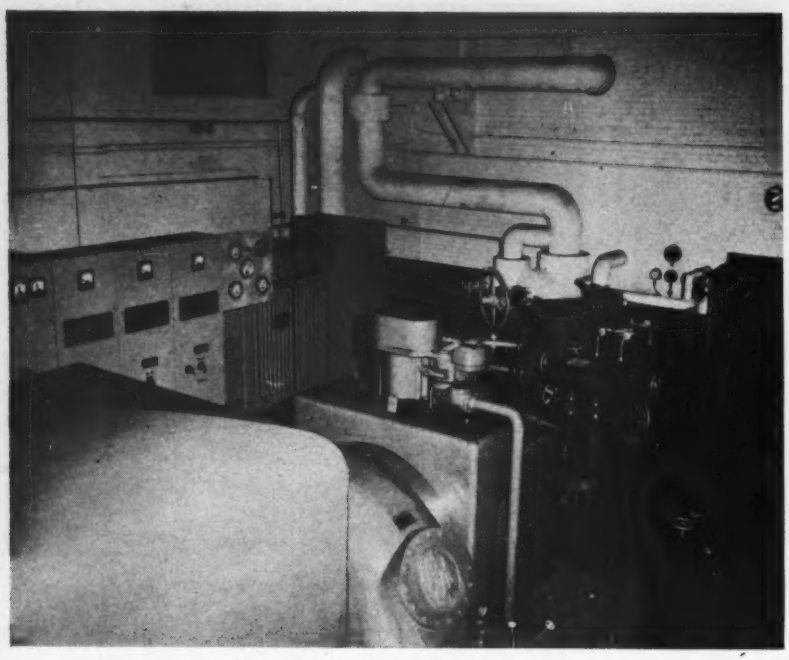
The Babcock and Wilcox boiler, capable of producing 105,000 lbs. of steam per hour, has a normal load rating of 95,000 lbs. per hour at 600 psi, at a temperature of 700 deg. F. Johns-Manville 85 per cent magnesia block insulation and fire brick lining for the boiler were installed by a sub-contractor, Wm. Summerhays Sons.

Steam line insulation, 3 to 4 inches thick, 85 per cent magnesia blocks, was held in place by #16 ga. black annealed wire. The joints were sealed with asbestos cement and covered with an 8 oz. canvas jacket.

### Turbine-Generator

A 14 stage General Electric turbo-generator, with a capacity of 3500 KW, .8 P.F., 2300/4160 volts, and a 25 KW exciter are controlled by GE metalclad

Pyranol transformer and Cabinetrol at west end of turbine room. Photo was taken from trolley of 20-ton overhead crane (see extreme right).



Turbine generator control panel at left.

switchgear equipment, of the indoor type (MI-6, vertical lift).

The turbine is designed for 600 psi and 750 deg. initial pressure, 110 lbs. extraction pressure, and 1.5" absolute exhaust. Provision is made for synchronizing with the Frontenac Power Company, and for the present with Central New York Power Company, although the plant will be operated independently in the future.

Switchgear equiment, for feeders to pulp and paper mill, is installed for all future requirements. Unit substations of 500 KVA multiples will be used in the plant, to reduce 2300 volt power to 440 volts for mill motors. One of these, Pyranol cooled, is installed in the Turbine room for power plant use.

View of new digester area, showing igneous rock formation which was responsible for delay in excavation. Proximity of mill buildings on three sides prevented use of explosives. Note feathering wedges along edge of rock formation.

Surface condensing equipment, by C. H. Wheeler Company, includes an eccentric-rolled, copperbearing steel plate shell, of the radial bank type, two-pass surface condenser, with domed steel inlet. A twin-bank, two stage type steam jet air ejector is mounted on a combined inter and after condenser, and an automatic drain control is provided for automatically returning the condensed steam from the ejector condenser to the main condenser.

The circulating pump is dual driven, by either a 200 HP motor, or GE steam turbine of similar capacity. The condensate pump is also dual driven.

An automatic combustion control panel, furnished by the Bailey Meter Company, is mounted between the new boiler and boiler feed pumps. The board contains selector valves and relays to control feed water, heavy and light oil, forced and induced draft, coal feed, exhaust damper, and tempering air. An electric clock is balanced at the top of the board by a pressure gauge. The board also contains two Yarway remote water level indicators, 4 multi-pen recorders (for feedwater level, steam flow-air flow, feed water temperature, flue gas and air temperature) and multi-pointer draft gauges.

### Color Scheme

The "Dynamic Color" treatment has been applied to most of the new plant. This includes the following color pattern: ceilings and tops of walls—flat white; major part of the walls—cream; about 6 foot borders at foot of all walls—vesta green; floors—slate gray; electrical outlets, switch-boxes—bright orange; over-head crane in Turbine room—bright yellow. All valve controls are painted bright yellow, and the large equipment, such as the turbo-generator and pyranol transformer, is dark green. The boiler is painted black, and the switchgear and cabinetrol equipment a pearl gray.

This color system, which has been tested in industrial plants throughout the nation, is said to increase both the workers' visuality and efficiency.

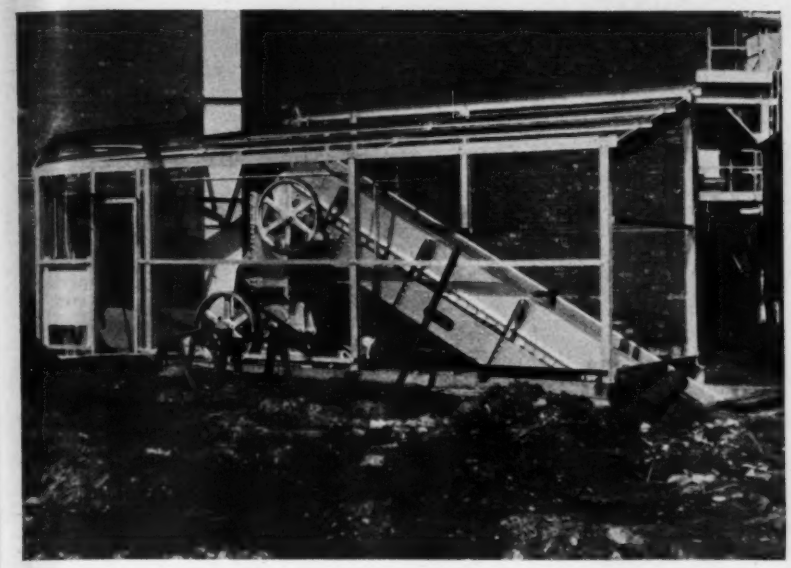
### Lighting & Heating

Lighting is provided by combination incandescent and mercury-vapor fixtures, plus conventional reflector type lights with incandescent bulbs.

Heating, utilizing both unit heaters and fin type radiators, were in operation before the completion of the rest of the construction, much to the satisfaction of the laborers, who worked in the North Country's below-zero weather this past winter.

### Digester

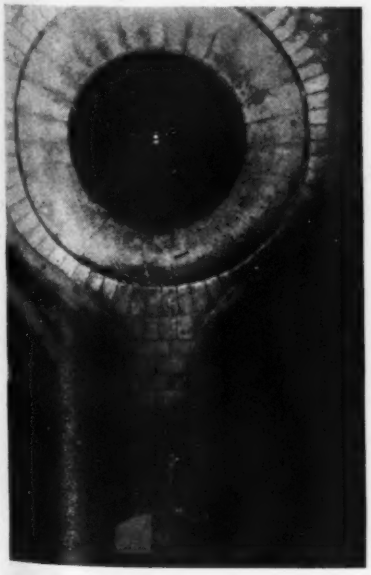
Installation of two 43-ton, stainless steel clad, horizontal digestors, by Lukenweld Steel Company, has been com-



View of coal handling equipment, before Transite siding was applied. Bucket elevator (enclosed) to roof is seen in center.

Raymond mill pulverizer. Drive is mounted on opposite side, between concrete foundation legs.

pleted after a delay in construction due to severe weather conditions in February and March. The digesters have been completely insulated with 2" thick Johns-Manville Superex blocks (6" by 36"), which were applied in broken longitudinal joint construction by the Smith-Murray Company. The blocks were held in place on the body of the digesters by stainless steel straps (¾" wide) and on the ends by 14 ga. stainless steel wire. All joints were pointed and sealed with a troweled coating of Superex cement, which was covered by 2" mesh chicken wire. Over this was applied a mixture of Superex and Portland cement. Finally, before the aluminum paint, was applied a concrete primer and Asbestile and Aertite cement.



Interior of boiler, showing lower burner nozzle and fire door. Photo was taken shortly after initial test firing for leaks, etc.

**Principal Equipment and Contractors**

General contractors: *Merritt-Chapman-Scott Corp.*

Consulting engineers: *Douglas M. McBean, Inc.*

Boiler: *Babcock & Wilcox Co.*

Turbogenerator, switchgear, and cabinetrol: *General Electric Co.*

Surface condenser: *C. H. Wheeler Corp.*

Raymond mill (pulverizer): *Combustion Engineering Corp.*

Water treatment: *Infilco, Inc.*

Pumps: *Ingersoll-Rand Co., and C. H. Wheeler Corp.*

Feed pump driver: *Terry Steam Turbine Co.*

ID and FD fans: *Claridge Co.*

Automatic combustion control and metering: *Bailey Meter Co.*

Feed water regulator: *Bailey Meter Co.*

Ash handling equipment: *United Conveyor Corp.*

Coal handling equipment: *Jeffry Mfg., Co., and Syracuse Supply Co.*

Motors and starting equipment: *General Electric Co.*

De-aerator: *Cochrane Corp.*

Preheater: *Air Preheater Corp.*

Feed water heater: *Griscom Russell Co.*

Oil heater and pumps: *Peabody Engineering Corp.*

Steam piping insulation: *Smith-Murray Corp.*

Boiler insulation: *Wm. Summerhays Sons.*

Sawdust conveyor: *Sterling Blower Co.*

Roofing: *Witt Roofing Co.*

Digester basement lining: *Stebbins Engineering Co.*

Boiler, during construction. Note fire door (open) surmounted by twin oil-burners.

# Meetings

**ASSOCIATION EXECUTIVES: Please send us your meeting dates and locations for this column as far in advance as possible. No charge for publication.**

*NOVEMBER 18-19:* Production Conference, American Management Ass'n. Hotel Drake, Chicago.

*NOVEMBER 19:* American Society for Testing Materials, New England District. Hotel Sheraton, Worcester, Mass.

*NOVEMBER 29:* American Society for Testing Materials, Pittsburgh District, Mellon Institute.

*NOVEMBER 29-DECEMBER 4:* National Exposition of Power and Mechanized Engineering, Grand Central Palace, New York City.

*DECEMBER 2-3:* Insurance Conference, American Management Ass'n., Hotel Drake, Chicago.

**1949**

*JANUARY 13:* American Society for Testing Materials, Philadelphia District. Franklin Institute.

*JANUARY 20-21:* Finance Conference, American Management Ass'n. Hotel Pennsylvania, New York.

*FEBRUARY 3:* American Society for Testing Materials, New York District. Engineering Society Building.

*FEBRUARY 9:* Southern Pulpwood Conservation Ass'n. Atlanta Biltmore Hotel, Atlanta, Ga.

*FEBRUARY 10:* American Society for Testing Materials, Philadelphia District. McAllister's, 1811 Spring Garden Street.

*FEBRUARY 14-16:* Personnel Conference, American Management Ass'n. Palmer House, Chicago.

*FEBRUARY 20-25:* Annual Convention, American Paper & Pulp Ass'n. Hotel Waldorf-Astoria, New York. For details, write to E. W. Tinker, Executive Secretary, 122 East Forty-Second Street, New York 17, N. Y.

*FEBRUARY 22:* SAPI Luncheon, Hotel Waldorf-Astoria. For details, write to E. G. Amos, Secretary-Treasurer, Salesmen's Ass'n. of the Paper Industry, 122 East Forty-Second Street, New York 17, N. Y.

*FEBRUARY 28-MARCH 4:* Spring Meeting and A.S.T.M. Committee Week, American Society for Testing Materials. Edgewater Beach Hotel, Chicago.

*MARCH 17-18:* Marketing Conference, American Management Ass'n. Hotel Pennsylvania, New York.

*MARCH 22:* American Society for Testing Materials, Philadelphia District. Franklin Institute.

*APRIL 14-15:* Production Conference, American Management Ass'n. Hotel Pennsylvania, New York.

*MAY 10-12:* Packaging Conference, American Management Ass'n. Auditorium, Atlantic City, N. J.

*MAY 10-13:* Eighteenth National Packaging Exposition. Public Auditorium, Atlantic City, N. J. For details, write to Mr. James O. Rice, Sec., 330 West 42nd St., New York, N. Y.

*MAY 26-27:* Insurance Conference, American Management Ass'n. Hotel New Yorker, New York.

*JUNE 8-9:* General Management Conference, American Management Ass'n. Hotel Pennsylvania, New York.

*JUNE 15-17:* National Convention of the American Pulp and Paper Mill Superintendents Ass'n. Hotel Haddon Hall, Atlantic City, N. J.

*JUNE 17-18:* Paper and Twine Association. French Lick Springs, Indiana. For details, write to Mr. John L. Richey, Sec.-Treas., Suite 651-653, Hotel Sinton, Cincinnati 2, Ohio.

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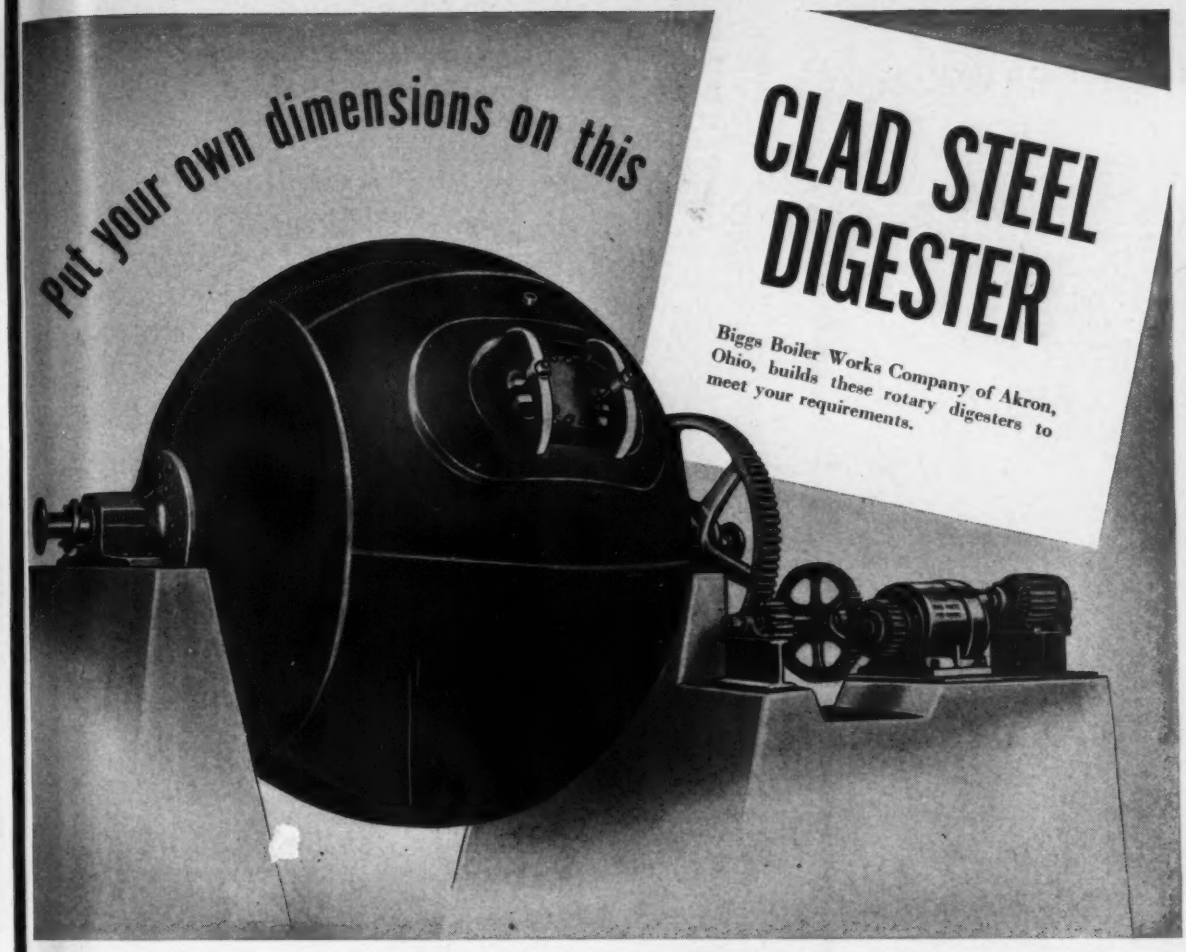
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# *Biggs makes them 3 feet to 14 feet*

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# Financial Record

| Preferred Stocks | Per Share Calendar Year 1947 | Earnings 12 Mos. to Approx. 9/30/48 | Indic. Annual Divid. Rate | Nov. 17 Closing Market Price |
|---|---|---|---|---|
| Armstrong Cork Co. $3.75 Cum. | $38.64* | $43.53*i | $3.75 | 94⅛ |
| Armstrong Cork Co. $4.00 Cum. Conv. | 38.64* | 43.53*i | 4.00 | 107 |
| Celotex Corp. 5% Cum. | 24.25c | 26.25g | 1.00 | |
| Champion Paper & Fibre $4.50 Cum. | 65.90f | | 4.50 | |
| Container Corp. of Amer. 4% Cum. | 102.74 | 98.49 | 4.00 | |
| Crown Zellerbach $4.20 Cum. | 56.40f | 55.07g | 4.20 | |
| Crown Zellerbach $4.00 Cum. Conv. 2nd | 211.39f | 217.70g | 4.00 | |
| Dixie Cup Co. $2.50 Cum. Conv. Cla | 9.16 | 9.61 | 2.50 | 49 |
| Flintkote Co. $4 Cum. | 81.91 | 87.68 | 4.00 | |
| Robert Gair Co., Inc. 6% Cum. | 18.01 | 15.97 | 1.20 | |
| International Paper Co. $4 Cum. | 236.51 | 242.27 | 4.00 | 93 |
| Johns-Manville $3.50 Cum. | 128.81 | 175.15 | 3.50 | |
| Kimberly Clark Corp. 4½% Cum. | 70.03 | 82.79 | 4.50 | |
| Kimberly Clark Corp. 4% Cum. Conv. 2nd | 95.88 | 114.55 | 4.00 | |
| MacAndrews & Forbes 6% Cum. | 62.20 | 59.89 | 6.00 | |
| Mead Corp. 4¼% Cum. | 81.56 | 80.43 | 4.25 | 82 |
| Mead Corp. 4% Cum. Conv. 2nd | 53.34 | 51.89 | 2.00 | |
| Paraffine Cos. Inc. 4% Cum. Conv. | 152.76a | 158.96 | 4.00 | |
| Rayonier Inc. $2 Cum. | 13.58 | 16.09 | 2.00 | 32⅜ |
| St. Regis Paper Co. 4.40% 1st A | 76.93 | 85.00 | 4.40 | 84 |
| Scott Paper Co. $3.40 Cum. | 43.95 | 54.31 | 3.40 | 88 |
| U. S. Gypsum Co. 7% Cum. | 211.34 | 300.59 | 7.00 | |
| United Wallpaper Inc. 4% Cum. Conv. | (d)1.35a | (d)6.28 | 2.00 | |
| West Virginia Pulp & Paper 4½% Cum. | 75.75c | 78.49g | 4.50 | |
| **Common Stocks** | | | | |
| APW Products Co. | $1.24 | $1.46i | $0.25 | |
| American Writing Paper Corp. | 1.61 | 0.02 | 0.25 | |
| Armstrong Cork Co. | 6.41 | 7.17i | 2.60 | 46⅝ |
| Celotex Corp. | 6.59c | 7.15g | 2.00 | 25⅛ |
| Certain-Teed Prods. Corp. | 3.75 | 3.99 | 0.90 | 13½ |
| Champion Paper & Fibre | 5.57f | | 2.00 | 24 |
| Congoleum Nairn Co. | 4.55 | 5.12i | 2.25 | 31½ |
| Container Corp. of America | 10.09 | 9.54 | 4.50 | 35 |
| Crown Zellerbach | 6.81f | 6.53g | 2.00 | 26⅛ |
| Dixie Cup Co. | 5.87 | 6.26 | 1.00 | 25⅛ |
| Flintkote Co. | 6.27 | 6.28 | 3.00 | 32 |
| Robert Gair Co. Inc. | 2.83 | 2.49 | 0.40 | 6⅜ |
| Great Northern Paper Co. | 4.56 | 4.41i | 2.80 | 36¼ |
| International Paper Co. | 15.02 | 15.39 | 5.00 | 53¼ |
| Johns-Manville Corp. | 3.17 | 4.28 | 1.40 | 38⅜ |
| Kimberly-Clark Corp. | 4.29 | 5.16 | 1.40 | 20⅝ |
| MacAndrews & Forbes Co. | 3.68 | 3.53 | 2.50 | |
| Marathon Corp. | 3.39c | 3.93g | 1.40 | 22¼ |
| Mead Corp. | 7.33 | 7.11 | 2.00 | 16¾ |
| National Container Corp. | 4.13 | 3.11i | 1.20 | 10 |
| Paraffine Cos. Inc. | 2.40a | 2.50 | 1.20 | |
| Rayonier, Inc. | 7.30 | 8.88 | 2.00 | 28⅛ |
| Ruberoid Co. | 10.88 | 12.13i | 2.75 | 59 |
| St. Regis Paper Co. | 2.66 | 2.86 | 0.80 | 9⅛ |
| Scott Paper Co. | 3.02 | 3.79 | 2.50 | 88 |
| Sutherland Paper Co. | 6.87 | 6.43 | 2.50 | 37½ |
| Taggart Corp. | 1.29 | | 0.60 | |
| Union Bag & Paper Corp. | 7.93 | 8.13 | 3.00 | 29⅜ |
| United Board & Carton | 4.95b | 3.39h | 1.00 | |
| U. S. Gypsum Co. | 10.00 | 14.36 | 6.00 | |
| United Wallpaper | (d)0.11a | (d)0.27 | —— | 3½ |
| West Virginia Pulp & Paper | 11.40c | 11.56g | 4.00 | |

(a) Year ended 6/30/48
(b) Year ended 5/30/48
(c) Year ended 10/31/47
(d) Deficit
(f) Year ended 4/30/48
(g) 12 months to approximately 7/31/48
(h) 12 months to 8/21/48
(i) 12 months to approximately 6/30/48
(*) Pro forma

## Dividends Declared

*International Paper Co.* and subsidiaries report net profit of $45,358,851 for the nine months ended September 30, 1948, equal to $12.55 a share, compared with net profit of $43,124,402 or $11.92 a share in the same period of 1947. After a reserve of $4,000,000 for price adjustments and a sum of $4,500,000 set aside to replace capital assets, there was a balance to surplus of $36,858,851, equal to $10.16 a share, against $9.79 in 1947. September quarter net of $16,802,414 was equal to $4.66 a share, against $16,716,492 or

$4.63 a share in the previous year. The company on November 9 voted an extra of $1 and regular quarterly of $1 on the common, both payable December 15. This will bring payments for 1948 to $5, against $4 paid in 1947.

*Powell River Co., Ltd.* Regular quarterly dividend of 40 cents per share plus an interim extra dividend of 65 cents per share, both payable December 15, ex-coupon December 14. This means that a total of $2.75 a share has been reported when the last-mentioned payments are added to the previous quarterly dividends of 40 cents each and an extra of 50 cents on June 15. It is the same as in 1947.

The December extra in 1947 was 90 cents, although the quarterly payments were smaller, with the regular quarterly basis last year having been 30 cents in the first quarter and 35 cents in the other three quarters.

*Hollingsworth & Whitney Co.*—Consolidated net income after taxes, of $2,722,866 for the 39 weeks ended September 26, equal after preferred dividends to $6.70 per share on the common: In addition, net tax refunds carried to surplus amounted to 15 cents per share. Directors declared a dividend of 87½ cents on the common, payable December 11, 1948 to stock of record, November 26. With the current declaration, dividends for 1948 total $2.50 per share compared with $2.12½ per share in 1947.

*Celanese Corp. of America* — Consolidated net income, first nine months of 1948 amounted to $29.792,772 after all charges and taxes, equal to $4.99 on the common stock, compared with net of $16,626,579, or $2.60 a common share, in the corresponding period last year. For the three months ended September 30, net income of the company totalled $9,023,910 after all charges and taxes, equivalent to $1.49 on the common, contrasted with $11,024,933, or $1.86 a share, in the June quarter, and $5,593,134, or 87 cents a share, in the three months ended September 30, 1947.

*Masonite Corp.*—Net sales in the fiscal year ended August 31, 1948, were $36,472,950, an increase of 44 percent over the previous year. Net earnings amounted to $7,027,335, equal to $11.71 a share on the 600,000 shares of outstanding common stock, compared with $4,381,142, or $7.30 a share for the 1947 fiscal year. Total dividend payments for the year were $1,800,000 or $3 a share, compared with $1,200,000, or $2 a share in 1947. The regular dividend rate is now on the basis of $2 annually. Earnings of $8.71 a share were retained in the business.

*Masonite Corp.* on November 3 declared a regular quarterly dividend of 50 cents a share on the outstanding 600,000 shares of comomn stock payable on November 30 to stockholders

*(Continued on page 136)*

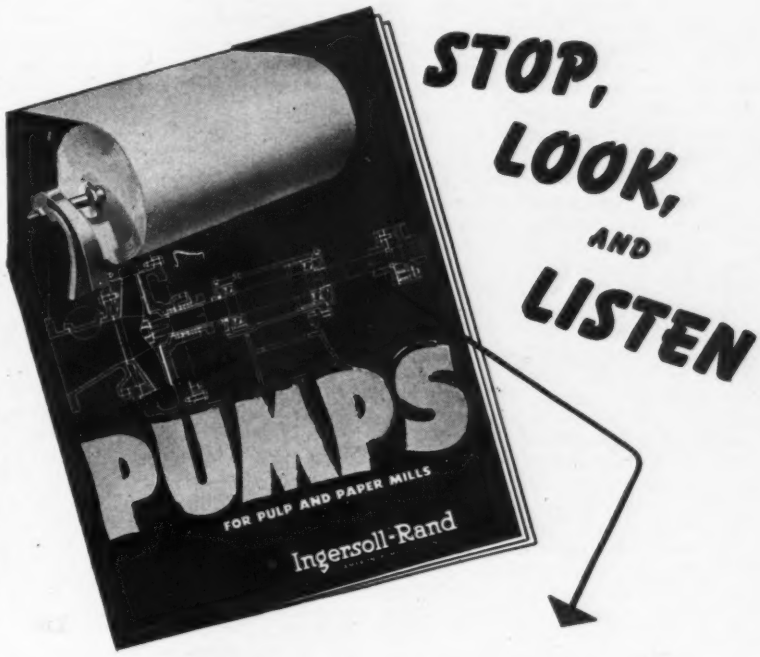
## Security Values Up

TORONTO—The improvement that has taken place in the pulp and paper group of securities is highlighted in Con-Comparisons of selected common stocks.

With one exception, St. Lawrence Corp., all companies have shown several-fold betterment in per-share earnings, and some that started on the deficit side in the tabulation have blossomed into good earning power.

The one stock that ran against the trend in this group, St. Lawrence Corp., is parent company of St. Lawrence Paper Mills, Brompton Pulp & Paper, and Lake St. John Power & Paper.

Price Bros., had the only wide gain in the first two years of the tabulation. Since 1945 the general improvement has been substantial in virtually every instance. In 1945, Abitibi was in the red 40 cents a share, but earned $5.11 a share in 1947. Bathurst rose from 94 cents to $3.25 per share; B. C. Pulp from $3.76 to $25.17; Great Lakes Paper from a deficit of 12 cents a share to per share earnings of $3.59, and so on.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102-10

# Trends

Office of the PAPER TRADE JOURNAL,
Wednesday, November 17, 1948.

### Swedish Export Program

A 25 percent increase in exports is set as one of the main goals of Sweden's Economic Four-Year Program, reports the Business News Letter from Sweden. "An economic long-range program covering the period from 1947 to 1952-53 has been submitted by the Swedish Government to the OEEC in Paris. It is based on the premise that Sweden now finds itself in a new period of industrialization when the increase in exports needed to finance the necessary imports can no longer be achieved by an intensified use of the country's natural resources.

"The general goal of the plan is to obtain visible and invisible exports of such proportions that a balance in Sweden's international payments will be obtained by 1952-53 without the country having to resort to borrowing abroad. This will necessitate an increase in production especially in the export industries. . . . The Liberal *Dagens-Nyheter* emphasizes that an increase in exports, which is the main theme of the program, seems imperative in view of the balance of payments figures, but that great efforts will have to be made to achieve it. . . . Despite the difficulties in increasing exports to the U. S., the reports say it is believed that this country's share in total Swedish exports will increase from 10 percent in 1938 and 13 percent in 1947 to 14 percent in 1952-53. . . . The report does not attempt to present a complete picture of all plans aimed at boosting production or exports, but it makes a survey of some fields which are of special importance to the national economy. . . . At present, exports of lumber and cellulose are lower than they were before the war, while shipments of paper and cardboard have gone up. In the export of cellulose, high-quality pulp plays an increasingly important part. Since 1939, the bleaching capacity of the Swedish cellulose industry has been doubled, and special efforts have been made to raise the output of rayon pulp and bleached paper pulp. As for paper, tightened restrictions on domestic consumption and the continued increase in production capacity should enable Sweden to step up exports by 20 percent compared with prewar figures.

### Wood Pulp

In view of the small tonnage currently coming from Europe, Mr. Karl A. Clauson, Secretary of the Association of Pulp Consumers, does not anticipate that the Atlantic dock strike will affect his membership, except in cases where special qualities are involved.

Rumors of further softening in Swedish pulp prices were confirmed this week. Word comes from Sweden of substantial quantities of chemical pulp still unsold, with indication of lowered prices in 1949's first quarter. Spot offerings of Swedish Bleached Kraft and other grades at $20.00 below contract levels also are interpreted by some as a trend in this direction.

### Waste Paper

To the sustained dull trading of the waste paper market have been added two more obstacles: a tie-up of exports through the dock strike and a rail embargo on exports routed through New York and Boston, with consequent restriction of freight car movements for domestic shipping. Buying is reported as slow in all leading centers with accumulated stocks posing a continual problem.

Heaviest stocks are reported locally where prohibitive freight rates forbid long distance shipping. Eastern waste paper dealers, through their representatives to the National Association's meeting in San Francisco on November 9 and 10, sought to raise funds to retain counsel to present a plea to the Interstate Commerce Committee to have freight rates reduced on waste paper. Subscriptions of more than $7,000 have been collected in New York, with $2,000 contributed by the New York Association of Dealers in Paper Mill Supplies, Inc.

Election week was reported by ECC to be a trifle under the year's average in collections and consumption of waste paper. For the year's first 45 weeks, collections were 9 percent better than the similar period of 1946 and 2.5 percent below the corresponding weeks of last year. Consumption was 10.5 percent ahead of 1946 and 1.7 percent below 1947. Mills bought none for inventory during the week, "nor is much expected except in *mixed* and *news* grades during the next few weeks," Director Colley S. Baker states. "Present inventories in these grades are substantially lower, although present *news* inventory in Eastern mills is a great deal higher today than in November, 1946, substantially that of January 1, 1947. Paperboard mills are consuming about three-fourths of the waste paper now being purchased, the rest going to paper and building board mills."

Pulp substitute grades continue soft in price, paralleling the slow buying of wood pulp. And while prices are reported as "quotably unchanged" there is no firmness to be found. Many lots are being offered below quoted levels with no takers. Kraft envelope cuttings, generally quoted at $75.00 to $80.00 plus dealer commission, f.o.b. New York, show considerable variance. In Boston, a trade paper quoted mill prices at $65.00 to $75.00 as top prices on this grade, while dealers in that city gave $80.00 and $90.00 per ton as their prices. Mill prices here in New York vary from $70 to $75.00 f.o.b. New York to $95 delivered, with the majority staying around $70 to $75. Dealer prices on manila tabulating cards are quoted as $65 to $70 f.o.b. New York, while mill prices hereabouts are general at $65 to $70 and $75. Accumulated stocks are likely to continue as the price-setter, particularly in view of the dock strike and rail embargo. And the likelihood of further softening in pulp prices would seem to indicate downward tendencies in waste paper prices.

### Rags

Writers for the waste materials industry see the 11c per delivered pound price for No. 1 White Shirt Cuttings as the aim of paper mills which is not likely to be reached this year. Quotations procured here from reliable sources and rechecked this week show mill prices on White Shirt Cuttings as $10.50 to $11.00 per hundred pounds, f.o.b. shipping point. Unbleached Muslins are steady at $11.00 to $11.50, all other grades showing softening of ½ to 1c per lb., as paper mills draw in restricted quantities. Demand for old rags also is limited, with a soft undertone to prices. Quotably they show ltitle change except where roofing rags have dipped again.

### Old Bagging

Prices are firm on an extremely strong market. Cautious buying has been advised because of the restricted supply situation in India caused by the Indian Government's ban on jute exports. This situation is seen as a temporary one which must be cleared up shortly. Meanwhile prices here show further advances.

### Indexes

Index of general business activity for the week ended November 6 dipped to 152.4 from 154 in the preceding week, compared with 148.3 in the corresponding week of 1947.

Index of paper board production inclined to 186.1 from 185.2 in the preceding week, compared with 182.4 in the corresponding week of 1947.

Comparative ratios of U. S. paper and paperboard production to mill capacity as reported by AP&PA are:

| | Nov. 6 1948 | Oct. 30 1948 | Nov. 8 1947 | Nov. 9 1946 | Nov. 10 1945 |
|---|---|---|---|---|---|
| Paper** ..... | 98.1 | ‡99.3 | 108.9 | 106.8 | 97.0 |
| Paperboard ... | 95.0 | 96.0 | 102.0 | 102.0 | 97.0 |

** Indicates 1948 volume of 176,758 tons. Comparable week, 1947—172,588 tons.
‡ Revised.

**Paperboard Production (Tons)**

| | Nov. 6 1948 | Oct. 30 1948 | Nov. 8 1947 |
|---|---|---|---|
| Production ..... | 189,689 | 193,819 | 185,873 |
| New Orders ..... | 244,448 | 199,563 | 222,903 |
| Unfilled Orders .. | 419,248 | 356,928 | 467,636 |

Percent of Activity, Current 95%; Year, 96%

# Imports

Week Ending Nov. 13

## NEW YORK

### Newsprint

Madden Reeve Angel & Co., Inc., Mormacmail, Helsingfors, 997 rolls.

(———), Tidaholm, Norrkoping, 365 rolls.

News Syndicate Co., Colabee, Baie Comeau, 6636 rolls.

R. A. Olsen, G.T.D., Donnacona, 335 rolls.

News Syndicate Co., Ida Bakke, Dalhousie, 8251 rolls.

R. A. Olsen, Kermic, Donnacona, 311 rolls.

N. Y. Journal American, Markland, Liverpool, N.S., 1015 rolls.

N. Y. Herald Tribune, Markland, Liverpool, N.S., 1742 rolls.

N. Y. World Telegram, Markland, Liverpool, N.S., 721 rolls.

Brooklyn Eagle, Markland, Liverpool, N.S., 712 rolls.

Herald Statesman, Inc., Markland, Liverpool, N.S., 43 rolls.

Richmond Newspapers, Inc., (Richmond, Va.), Markland, Liverpool, N.S., 2060 rolls.

### Wallpaper

American Express Co., De Grasse, Havre, 23 cs.

Cassidy Hicks Wallpaper Co., Parthia, Liverpool, 12 ctns.

W. H. S. Lloyd & Co., Parthia, Liverpool, 50 pkgs., 1 cs.

### Filter Paper

H. Reeve Angel & Co., Inc., American Ranger, London, 32 cs.

### Drawing Paper

H. Reeve Angel & Co., Inc., American Ranger, London, 2 cs.

### Printing Paper

S. H. Pomerance, American Ranger, London, 1 cs.

### Photo Paper

Lep Transport Ltd., American Ranger, London, 97 drums (base).

J. J. Gavin, Queen Elizabeth, Southampton, 7 cs.

### Gummed Paper

B. F. Drakenfeld & Co., Parthia, Liverpool, 43 cs.

### Cigarette Paper

Maron Shipping Agency, Agwidale, Havana, 66 cs.

### Paper Napkins

H. W. Robinson Co., Mormacmail, Copenhagen, 65 cs.

### Miscellaneous Paper

Sterling National Bank Trust Co., Tidaholm, Kotka, 795 rolls.

Madden Reeve Angel & Co., Inc., Tidaholm, Kotka, 676 rolls.

### Rags, Baggings, etc.

New England Waste Co., Mormacfir, Recife, 84 bls. cotton picker waste, 61 bls. cotton waste.

Manufacturers Trust Co., American Builder, Manchester, 7 bls. wool rags.

E. J. Keller Co., Inc., Uruguay, Copenhagen, 298 bls. old bagging.

Continental Bank Trust Co., Vinni, Calcutta, 60 bls. rags.

(———), Vinni, Calcutta, 107 bls. old bagging.

J. Eisenberg & Son, Agwidale, Havana, 42 bls. cotton rags.

(———), Examiner, Calcutta, 28 bls. jute rags.

A. De Vries Trading Corp., American Inventor, Havre, 68 bls. scrap bagging.

Midwest Waste Material Co., Flying Independent, Antwerp, 101 bls. scrap bagging, 6 bls. jute threads, 116 bls. bagging.

National Bank of Detroit, American Defender, Rotterdam, 61 bls. bagging.

H. Adlerstein, Pres. Polk, Genoa, 99 bls. jute rags.

### Old Rope

(———), Examiner, Calcutta, 61 bls. old hemp rope cuttings.

### Gluestock, etc.

H. Remis, Cape Ann, Barranquilla, 200 rolls hidecuttings.

John Gorvers Co., Cape Ann, Barranquilla, 136 rolls hidecuttings.

Transatlantic Animal By-Products, Parthia, Liverpool, 200 bags gluestock.

### Woodpulp

Price & Pierce, Ltd., Markland, Liverpool, N.S., 968 bls. unbleached sulphite pulp.

### Woodpulp Boards

Jay Madden Corp., Tidaholm, Kotka, 117 rolls, 363 bls.

## PHILADELPHIA

Pulp Sales Corp., Tidaholm, Kotka, 185 bls. prime unbleached sulphite pulp.

(———), Tidaholm, Norrkoping, 437 rolls newsprint.

Madden Reeve Angel & Co., Inc., Mormacmail, Helsingfors, 980 rolls newsprint.

Jay Madden Corp., Mormacmail, Helsingfors, 628 rolls wrapping paper.

National City Bank, Mormacmail, Helsingfors, 254 bls. white dry mechanically ground wood pulp.

Pulp Sales Corp., Mormacmail, Helsingfors, 508 bls. white dry mechanically ground woodpulp.

## WINS NOBEL PRIZE

**Dr. Paul Herman Muller, a native of Switzerland, on December 10, will receive the Nobel prize for 1948 in Physiology and Medicine as a result of his work on DDT insecticides in the research laboratories of the Geigy Co., Inc., New York.**

## WASHINGTON LIAISON

**Alexander ("Al") Leggin, appointed assistant to Dr. Thomas H. Vaughn, vice president—research, Wyandotte Chemicals Corp., Wyandotte, Mich. His office is at 2025 Eye St., N. W., Washington 6, D. C.**

## BALTIMORE

Madden Reeve Angel & Co., Inc., Tidaholm, Kotka, 428 rolls newsprint.

(———), Tidaholm, Norrkoping, 332 rolls newsprint.

Madden Reeve Angel & Co., Inc., Mormacmail, Helsingfors, 150 rolls newsprint.

## NEWPORT

Stora Kopparberg Corp., Tidaholm, Gefle, 1466 rolls newsprint.

(———), Tidaholm, Norrkoping, 830 rolls newsprint.

## Delaware Section Meetings

WILMINGTON, Del.—The Delaware Valley Section of TAPPI has scheduled its program for the remainder of the current season as follows:

November 29: "Measuring the Water Resistance of Paper," by F. T. Carson, Paper Section, National Bureau of Standards.

December: No meeting.

January 27, 1949: "Synthetic Rubber Latices as Adhesives for Mineral Pigment Coated Papers," by Elmer K. Stilbert, Jr., Coatings Development, Dow Chemical Co.

February: No meeting as date conflicts with national TAPPI meeting.

March 24: "Recent Progress in Cellulose Research," by Prof. Herman Mark, Polytechnic Institute of Brooklyn.

April 28: "Testing Methods." Panel discussion.

May 26: "Long Range Picture of Pulp Supply." Speaker to be announced.

All of the foregoing meetings will be held at the Engineers Club, 1317 Spruce street, Philadelphia.

## Ratio of Profit

WASHINGTON—The paper and allied products industry had a ratio of profit, measured in the return on stockholders' equity, of 4.8 and 4.3 percent after Federal taxes, for the first and second quarters respectively, of this year, the Federal Trade Commission reports.

This rate compared with 5.1 and 4.7 percent for the last two quarters of 1947. Profits in cents per dollar of sales for the first and second quarters of 1948 was reported respectively as 8.7 and 8.9 cents, and for the last two quarters of 1947, as 10.3 and 8.3 cents per dollar of sales, all after Federal taxes.

## Christmas Wind-Up

OTTAWA—Most pulpwood companies in the Maritime Provinces plan to produce about half of last year's cut and should complete operations there before the Christmas holiday, the Labor Department of the Canadian Government reports.

## Stanford Party Conference

WASHINGTON—A combination weekend business conference and outing was held by 30 key employes of the Stanford Paper Co., at the Blue Ridge Rod and Gun Club near Harpers Ferry, West Va., on Saturday and Sunday, November 6 and 7.

# Prices

**Quotations indicate trends in an open market. At the moment they can be of little more value. While some volume business still is done under contract at the figures shown, fluctuations are too varied and frequent to permit prices to be interpreted as representing a wholly stabilized market.**

## NEW YORK

### Paper

(Delivered New York)

Standard News, per ton—

| | |
|---|---|
| Rolls, contract | $100.00/ — |
| Sheets | 115.00/ — |

Kraft—per cwt.—Carload Quantities Zone A Deld. 40 lb. base wgt.

| | |
|---|---|
| Superstandard Wrapping | $9.00/ — |
| No. 1 Wrapping | 7.75/ 8.00 |
| Standard Wrapping Rolls | 7.00/ — |
| Standard Wrapping Sheets | 7.50/ — |
| Standard Bag | 6.50/ — |

Tissues—Per Ream 24x36 (480) 10/11 lbs. Zone 1.

| | |
|---|---|
| Wh. No. 1 Frd. | $1.84/$2.00 |
| Wh. No. 1 M. G. | 1.94/ 2.00 |
| Wh. No. 1½ | 1.65/ — |
| Wh. No. 2 | 1.50/ 1.70 |
| Kraft Anti-Tar | 1.65/ — |
| Kraft Unbl. | 1.85/ — |
| Shred. Wh. No. 1 per lb. | .12¾/ .18 |

Toilet—Per Case of 100 rolls—1 M Sheets.

| | |
|---|---|
| Unbleached | $7.50/$10.00 |
| Bleached | 8.75/ 10.00 |

Paper Towels—Per Case of 3750—Zone 1.

| | |
|---|---|
| Wh. Jr. M'tif'd 9¼x9½ | $5.45 |
| Br. Sr. M'tif'd 10x12 | 3.80 |
| Br. Jr. M'tif'd 9½x9¾ | 3.30 |
| Br. Jr. Sgl. fold 10x10¾ | 3.35 |

Manila—per cwt.—C-1 f.a.

| | |
|---|---|
| No. 1 Jute Tag | $14.50/ — |
| Reg. Jute Manila | 13.25/$15.50 |
| No. 1 Manila Wrapping | 8.75/ 10.50 |
| 5 lb. Manila | 10.75/ 11.25 |

Boards, per ton—

| | |
|---|---|
| Filled News | 94.00/ |
| Plain Chip | 85.00/ 90.00 |
| Blchd. Mla. L-d. Chip* | 105.00/ |
| White Pat. coated* | 120.00/ |
| Kraft Liners 42 lb. | 105.00/ |
| Kraft Corr. .009 | 110.00/ |
| Binders Boards | 126.00/ |

* Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following prices are representative of distributors' resale prices, all deliveries in Zone 1:

Rag Content Bonds and Ledgers—

White, 16 lb.

Bonds, per cwt.

| | Carton | 4 C't'n | Ton |
|---|---|---|---|
| 100% Rag Ext. No. 1 | $59.00 | $54.55 | $52.30 |
| 100% Rag | 52.25 | 48.30 | 46.30 |
| 75% Rag | 41.50 | 38.30 | 36.70 |
| 50% Rag | 33.75 | 30.70 | 29.50 |
| 25% Rag | 30.25 | 27.45 | 26.35 |

Ledgers, per cwt.

| | | | |
|---|---|---|---|
| 100% Rag Ext. No. 1 | $57.00 | $52.65 | $50.50 |
| 100% Rag | 50.25 | 46.40 | 44.50 |
| 75% Rag | 41.50 | 38.30 | 36.70 |
| 50% Rag | 33.75 | 30.70 | 29.50 |
| 25% Rag | 30.25 | 27.45 | 26.35 |

Sulphite Bonds and Ledgers—

White, 16 lbs.

Bonds, per cwt.

| | | | |
|---|---|---|---|
| No. 1 | $21.25 | $19.25 | $18.50 |
| No. 2 | 20.25 | 18.30 | 17.55 |
| No. 4 | 19.25 | 17.55 | 16.85 |

Ledgers, per cwt.

| | | | |
|---|---|---|---|
| No. 1 | $21.75 | $19.65 | $18.85 |
| No. 2 | 20.75 | 18.75 | 18.05 |
| No. 4 | 20.00 | 18.10 | 17.35 |

White Book, per cwt.—

Coated

| | Case | Ton |
|---|---|---|
| No. 1 Glossy | $20.90 | $20.15 |
| No. 2 Glossy | 19.65 | 18.90 |
| No. 3 Glossy | 18.90 | 18.25 |
| Machine Coated | 16.65 to 17.15 | 16.05 to 16.35 |

Uncoated

| | | |
|---|---|---|
| No. 1 Antique (Watermarked) | 16.40 | 15.80 |
| Offset | 15.15 to 17.15 | 14.60 to 16.40 |
| A Grade E. F. | 15.40 | 14.85 |
| A Grade S. C. | 15.90 | 15.35 |
| B Grade E. F. | 15.15 | 14.55 |
| B Grade S. C. | 15.65 | 14.95 |

### Wood Pulp

Fourth Quarter

Domestic mill contract prices delivered with varying freight allowances.

| | Per Short ADT |
|---|---|
| Groundwood | $80.00/ $81.00 |
| Unbleached Sulphite | 124.00/ — |
| Bleached Sulphite | 125.00/ 135.00 |
| Bleached Soda | 130.00/ 135.00 |
| Bleached Sulphate | 155.00/ 165.00 |
| Unbleached Sulphate Northern | 120.00/ 130.00 |
| Unbleached Sulphate Southern | 110.00/ 125.00 |

### Canadian Quotations

Prices delivered with varying freight allowances unless otherwise specified:

| | Per Short ADT |
|---|---|
| Bleached Sulphate | $150.00/$160.00 |
| Unbleached Sulphate | 125.00/ 135.00 |
| Unbleached Sulphite | 125.00/ 126.00 |
| Bleached Sulphite | 125.00/ 135.00 |
| Glassine Unbleached Sulphite (no freight allowance) | 120.00/ — |
| Bleached Soda | 130.00/ — |
| Groundwood | 80.00/ 85.00 |
| Sideruns Pulping News | 80.00/ 90.00 |

### Swedish Quotations

On dock, Atlantic Ports

| | |
|---|---|
| Bleached Kraft | $165.00/ — |
| Bleached Sulphite | 165.00/ — |
| Unbleached Sulphite | 140.00/ 149.00 |
| Unbleached Kraft | 127.50/ — |

### Finnish Quotations

On dock, Atlantic Ports

| | Per Short ADT |
|---|---|
| Bleached Sulphite | $165.00/ — |
| Unbleached Sulphite | 140.00/ 143.00 |
| Unbleached Sulphate | 127.50/ — |

### Norwegian Quotations

On dock, Atlantic Ports

| | Per Short ADT |
|---|---|
| Bleached Sulphite | $165.00/$175.00 |

### New Domestic Cotton Cuttings

(Prices to Mill, F.o.b. Ship. Pt.)

| | | |
|---|---|---|
| White Shirt | $10.50/ | $11.00 |
| Unbleached Muslin | 11.00/ | 11.50 |
| Light Silesias | 8.25/ | 8.50 |
| White Back Blue Overalls | 7.50/ | 8.00 |
| Blue Overalls | 7.25/ | 7.75 |
| Fancy Shirt | 5.76/ | 6.25 |
| Percales | 6.50/ | 7.00 |
| Light Prints | 6.75/ | 7.25 |
| No. 1 Washables | 4.50/ | 5.00 |
| Bleachable Khaki | 6.75/ | 7.25 |
| Unbleachable Khaki | 6.00/ | 6.50 |
| Cottonades | 4.75/ | 5.25 |
| Lt. Flannelettes | 8.00/ | 8.50 |
| Men's Corduroy | 4.75/ | 5.25 |
| Women's Corduroy | 4.50/ | 5.00 |

### Old Domestic Cotton Rags

(Prices to Mill, F.o.b. Ship. Pt.)

| | Per 100 lbs. | |
|---|---|---|
| No. 1 Whites, Repacked | $5.00/ | $5.50 |
| No. 1 Whites, Miscellaneous | 4.00/ | 4.50 |
| No. 2 Whites, Repacked | 3.00/ | 3.50 |
| No. 2 Whites, Miscellaneous | 2.50/ | 2.75 |
| Blue Overalls | 3.50/ | 4.00 |
| Thirds and Blues Repacked | 2.75/ | 3.25 |
| No. 1 Roofing Rags | 1.40/ | 1.50 |
| No. 2 Roofing Rags | 1.25/ | 1.35 |
| No. 3 Jute Bagging | 1.15/ | 1.25 |
| No. 4 Brussels & hrd. bck'd crpts. | 1.25/ | 1.35 |
| No. 5A Roofing Rags | 1.25/ | 1.35 |

### New Foreign Cotton Cuttings

(Prices to Mill, F.o.b. Dock, N. Y.)

| | Per 100 lbs. | |
|---|---|---|
| New Dark Cuttings | $5.50/ | $5.75 |
| New Mixed Cuttings | 6.25/ | 6.50 |
| Light Silesias | 9.25/ | 9.50 |
| Light Flannelettes | 9.25/ | 9.50 |
| New White Cuttings | 12.00/ | 13.00 |
| New Unbleached Cuttings | 12.25/ | 13.00 |
| Fancy Shirt Cuttings | 6.50/ | 7.00 |
| Light Prints | 7.75/ | 8.00 |
| Bleachable Khaki, No. 1 | 7.00/ | 7.50 |
| Unbl. Khaki, No. 1 | 6.25/ | 6.75 |

### Old Foreign Rags

(Prices to Mill, F.o.b. Dock, N. Y.)

| | Per 100 lbs. | |
|---|---|---|
| No. 1 White Cottons | — / | — |
| No. 2 White Cottons | — / | — |
| No. 3 White Cottons | — / | — |
| No. 4 White Cottons | 3.50/ | 3.75 |
| Extra Light Prints | 6.50/ | 7.00 |
| Old Light Prints | 4.50/ | 5.00 |
| Med. Light Prints | 4.00/ | 4.50 |
| Dutch Blue Cottons | 5.25/ | 5.50 |
| Checks and Blues | 3.25/ | 3.50 |
| Linsey Garments | 2.15/ | 2.25 |
| Dark Cottons, European | 2.00/ | 2.10 |
| Dark Cottons, Egyptian | 1.90/ | 2.00 |
| Old Shopperies | nominal | |
| New Shopperies | nominal | |

### Bagging

(Prices to Mill, f.o.b. N. Y.)

| | Per 100 lbs. |
|---|---|
| Foreign Gunny, No. 1 | $8.00/$8.50 |
| Domestic Gunny, No. 1 | 7.50/ 8.50 |
| Heavy Wool Tares | 7.50/ 7.75 |
| No. 1 Crap Bagging | 7.25/ 7.50 |
| Roofing Bagging | 1.10/ 1.20 |
| Foreign Manila Rope | 5.50/ 5.75 |
| Domestic Manila Rope | 6.00/ 6.25 |
| Jute Strings | 7.00/ 7.25 |
| No. 1 Sisal Strings | 5.25/ 5.50 |
| Mixed Strings | 1.50/ 1.75 |

### Waste Paper

Base Prices to Mills for Average Packings F.o.b. New York, Baled

| | (Per Ton) | |
|---|---|---|
| No. 1 Hard White Envelope Cuts | 105.00/ | 110.00 |
| No. 1 Hd. Wh. Shavings, unruled | 90.00/ | 95.00 |
| Super Soft White Shavings | 100.00/ | 105.00 |
| No. 1 Soft White Shavings | 85.00/ | 90.00 |
| No. 1 Fly Leaf Shavings | 45.00/ | |
| No. 1 Gd'wd Fly Leaf Shavings | 30.00/ | 35.00 |
| No. 1 Heavy Books & Magazines | 19.00/ | 21.00 |
| Mixed Books | 13.00/ | 15.00 |
| No. 1 White Ledger | 55.00/ | 65.00 |
| Col. Ledger | 40.00/ | 45.00 |
| Manila Tab. Cards | 65.00/ | 70.00 |
| New Manila Envelope Cuttings | 70.00/ | 80.00 |
| Extra Manilas | 20.00/ | 25.00 |
| Mxd. Kraft, Bag Cuttings | 55.00/ | 60.00 |
| Kraft Envelope Cuttings | 70.00/ | 80.00 |
| Triple Sorted, No. 1 Brown Soft Kraft | 40.00/ | 45.00 |
| New Kraft Corrugated Cuttings | 35.00/ | 40.00 |
| No. 1 Assorted Old Kraft | 35.00/ | 40.00 |
| Used Kraft Bags | 35.00/ | 40.00 |
| New Jute Corrugated Cuttings | 18.00/ | — |
| Old Corrugated | 14.00/ | 15.00 |
| No. 1 News | 13.00/ | 14.00 |
| No. 1 Mixed Papers | 6.00/ | 7.00 |
| Box Board Cuttings | 7.00/ | 8.00 |
| White Blank News | 65.00/ | 70.00 |
| Overissue News | 17.00/ | 18.00 |
| Sulphite Mill Wrappers | 12.00/ | 14.00 |

### Twines

All Prices Nominal, F.o.b. Mill

(Soft Fiber)

| | |
|---|---|
| Coarse Polished—India | .35½/ .36½ |
| Fine Polished India | .41½/ .45 |
| Unpolished—Paper Makers | .32¼/ .34½ |
| Tube Rope | .33¼/ .35½ |
| Wrapping | .36 / .38¾ |
| Cotton | .58 / .60 |
| Polished Cotton | .55 / — |

(Hard Fiber)

| | |
|---|---|
| Mex. Sisal | .21 / .27 |
| Manila (Reprocessed) | .31 / .35 |

(American Hemp)

| | |
|---|---|
| Polished Hemp | .46½/ .48 |
| Unpolished | .35 / .37¼ |

## PHILADELPHIA

### Domestic Rags (new)

(F.o.b. Eastern Shipping Point)

| | |
|---|---|
| White Shirt | .10½/ .11 |
| Light Silesias | .07½/ .08 |
| Black Silesias, soft | .05½/ .06 |
| Unbleached Muslin | .10½/ .11¼ |
| Washable Prints | .06½/ .07 |
| Washable No. 1 | .05 / .05½ |
| Blue Overall | .07½/ .08 |
| Washable Shredding | .02¾/ .03¼ |
| Fancy Percales | .06¾/ .07¼ |
| Unbleachable Khaki | .05½/ .06½ |
| Bleachable Khaki | .06¼/ .06¾ |
| Men's Corduroy | .05½/ .06 |
| Ladies' Corduroy | .05 / .05½ |
| Cottonades | .05½/ .06 |

### Domestic Rags (Old)

(F.o.b. Eastern Shipping Point)

| | |
|---|---|
| White No. 1—Repacked | 4.50 / 5.00 |
| Mixed White | 4.00 / 4.25 |
| White No. 2—Repacked | 3.50 / 3.75 |
| Thirds and Blues— | |
| Miscellaneous | 2.50 / 2.75 |
| Repacked | 3.00 / 3.25 |
| Domestic No. 1 Roofing Stock | 1.55 / 1.60 |
| Domestic No. 2 Roofing Stock | 1.45 / 1.50 |
| Roofing Bagging | 1.35 / 1.40 |
| Old Manila Rope | — / 5.50 |

### Bagging

(F.o.b. Eastern Shipping Point)

| | |
|---|---|
| Foreign Gunny No. 1 | nominal |
| Domestic Gunny No. 1 | .07¼/ .07¾ |
| Sisal Strings No. 1 | .04½/ .05 |
| Sisal Strings No. 2 | .03½/ .04 |
| Sisal Jute | .02¾/ .03 |
| No. 1 Scrap | .06½/ .07 |
| No. 2 Scrap | .03 / .03½ |

### Waste Papers

F.o.b. Phila. Mill Prices, Baled

| | Per Ton |
|---|---|
| No. 1 Hd. White Envelope Cuts.. | 120.00/ 125.00 |
| No. 1 Hd. Wh. Shavings, unruled | 100.00/ — |
| Soft White Shavings | 85.00/ — |
| White Blank News | 65.00/ 75.00 |
| No. 1 White Ledger | 65.00/ — |
| No. 1 Heavy Books & Magazines | 20.00/ 22.00 |
| New Manila Envelope Cuttings | 75.00/ — |
| No. 1 Assorted Old Kraft | 35.00/ 40.00 |
| No. 1 Mixed Paper | 7.00/ 8.00 |
| Box Board Cuttings | 8.00/ 10.00 |
| New Kraft Corrugated Cuttings | 55.00/ 60.00 |
| Old Corrugated | 14.00/ 16.00 |
| Overissue News | 15.00/ 16.00 |
| No. 1 News | 11.00/ 13.00 |

## BOSTON

### Waste Papers

F.o.b. Boston, Mill Prices, Baled

| | Per Ton |
|---|---|
| No. 1 Hd. Wh. Shav., unruled | $135.00/ — |
| No. 1 Hd. Wh. Shavings, ruled | 90.00/ — |
| Soft White Shavings | 120.00/ 125.00 |
| No. 1 Fly Leaf Shavings | 45.00/ — |
| No. 2 Fly Leaf Shavings | 40.00/ 45.00 |
| No. 1 Grdwd. Fly Leaf Shvgs | nominal |
| No. 2 Groundwood Fly Leaf Shavings | nominal |
| Mixed Colored Shavings | 30.00/ — |
| New Manila Env. Cuts, one cut | 75.00/ — |
| Hard White Envelope Cuts, one cut | 120.00/ — |
| Triple S'ted No. 1 Br. Soft Kraft | 75.00/ 80.00 |
| Mixed Kraft Env. & Bag Cuttings | 45.00/ — |
| Kraft Envelope Cuttings | 80.00/ 90.00 |
| No. 1 Heavy Books & Magazines | 22.00/ — |
| New Manila Env. Cutt'gs, one cut | 47.00/ — |
| New Manila Envelope Cuttings | 80.00/ 85.00 |
| White Tabulating Cards | 80.00/ 90.00 |
| White Blank News | 65.00/ — |
| No. 1 Assorted Old Kraft | 50.00/ — |
| No. 1 Mixed Paper | 8.00/ 9.00 |
| Overissue News | 11.00/ 12.00 |
| No. 1 News | 11.00/ 12.00 |
| New Corrugated Cuttings, Kraft | 55.00/ 60.00 |
| Old Kraft Corrugated Containers | 35.00/ — |
| Old Corrugated Containers | 13.00/ 14.00 |
| Paper Strings | 40.00/ 45.00 |

### Bagging

(F.o.b. Boston)

| | (Per 100 lbs.) |
|---|---|
| Foreign Gunny | nominal |
| Domestic Gunny | 8.00 / 8.25 |
| Domestic No. 1 Old Rope | 6.00 / 6.50 |
| Foreign No. 1 Old Rope | 5.75 / 6.00 |
| Mixed Strings | 1.35 / — |
| Transmission Rope— | |
| Domestic | 3.00 / — |
| Jute Carpet Threads | — / 4.00 |
| Bleachery Burlap | — / 9.00 |
| Scrap Burlap— | |
| Foreign | 6.50 / 6.75 |
| Domestic | 6.75 / 7.00 |
| South America | 6.75 / 7.00 |
| Austr. Wool Pouches | 8.00 / — |
| New Zealand Wool Pouches | — / 5.50 |
| New Burlap Cuttings | 8.50 / — |
| Heavy Baling Bagging | 8.00 / 8.50 |
| Paper Mill Bagging | — / 6.00 |
| No. 1 Roofing Bagging | — / 1.40 |

### Domestic Rags (New)

(F.o.b. Boston)

| | (Per 100 lbs.) |
|---|---|
| New Light Prints | nominal |
| Fancy Percales | 7.00 / — |
| White No. 1 Shirt | 11.00 / — |
| Light Flannelettes | 8.00 / — |
| Canton Flannels, Bleached | 10.00 / — |
| Underwear Cutters, Bleached | 11.00 / — |
| Underwear Cutters, Unbleached | 10.50 /12.00 |
| Silesias No. 1 | 7.25 / — |
| Black Silesias | 4.50 / — |
| Red Cotton Cuttings | 4.50 / — |
| Blue Overalls | — / 8.00 |
| Soft Unbleached | 11.00 / — |
| Blue Cheviots | 7.00 / — |
| Fancy | 5.50 / — |
| Washable | 6.00 / — |
| Khaki Cuttings | 6.00 / — |
| Corduroy | 4.00 / — |
| Men's Corduroy | 4.50 / — |
| Khaki Canvas | — / 6.00 |
| B. V. D. Cuttings | 11.00 / — |

### Domestic Rags (Old)

(F.o.b. Boston)

| | Per 100 lbs. |
|---|---|
| No. 1 Whites, Repacked | 4.75 / 5.00 |
| No. 1 Whites, Miscellaneous | 4.25 / 4.75 |
| No. 2 Whites, Repacked | 2.50 / — |
| No. 2 Whites, Miscellaneous | 2.00 / — |
| Twos and Blues, Repacked | 1.25 / — |
| Old Blue Overalls | 4.00 / 4.50 |
| Thirds and Blues, Repacked | 2.00 / — |
| Black Stockings | 3.00 / 3.50 |
| No. 1 Roofing Stock | 1.55 / — |
| No. 2 Roofing Stock | 1.45 / — |
| No. 3 Roofing Stock | 1.25 / — |
| No. 4 Roofing Stock | 1.25 / — |
| No. 5, Quality A. | 1.35 / — |
| Old Manila Rope | 6.00 / — |

## CHICAGO

### Waste Paper

(F.o.b. Chicago) Mill Prices, Baled

| | |
|---|---|
| Shavings— | |
| No. 1 Hard White Envelope cuts, one cut | $100.00/ — |
| No. 1 Hard White Shavings, unruled | 90.00/ — |
| No. 1 Soft White Shavings | 80.00/ — |
| No. 1 White Ledger | 60.00/ — |
| No. 1 Heavy Books & Magazines | 28.00/ 30.00 |
| White Blank News | 50.00/ — |
| Mixed Kraft Env. & Bag Cuttings | 70.00/ — |
| No. 1 Assorted Old Kraft | 25.00/ — |
| Overissue News | 22.00/ — |
| No. 1 News | — / 18.00 |
| No. 1 Mixed Paper | 9.00/ — |
| Old Corrugated | 14.00/ 15.00 |
| Mill Wrappers | 11.00/ — |

# Markets

### Blanc Fixe

Supply good; demand steady. Pulp is currently quoted at $85.00 in bags, car lots at works, 6 cents per pound, l.c.l., deld.; by-product $75.00 per ton, car lots, at works, 6 cents per pound, l.c.l., deld.

### Bleaching Powder

Prices firm. Demand strong. Supply adequate. Prices range from $4.25 to $4.75 per 100-pound drums, l.c.l. works.

### Casein

Domestic prices firm. Manufacturers' holdings good. Demand light. Trading imported product dull. Current prices on processed acid precipitated casein at 28½ to 32 cents per pound for domestic grades and .26 to .28 cents for imported grades, f.o.b. shipping point.

### Caustic Soda

Easier demand has improved supply of dry and liquid types. Contract renewals reported at present price levels. Solid caustic is reported at $3.10 per cwt.; flaked and ground is quoted at $3.50 per cwt. in 400 pound drums, $4 to $4.25 per cwt. in 100 pound drums—car lots at works; liquid 50 percent in tank cars at $2.60 per cwt.; liquid 73 percent in tank cars at $2.60 per cwt., at works.

### China Clay

Demand steady. Supply excellent. Domestic filled clay is $9 to $11.50 per ton, car lots; coating clay is $14 to $22. Imported clay quotation, short tons, $16 to $35, export warehouse.

### Chlorine

Pickup in demand tightens supply. Shortage of tankcars hampers delivery. Currently quoted at $2.40 per cwt. in single unit tank cars; at $2.70 to $3.90 per cwt., in multi-tank cars, f.o.b., works.

### Rosin

Demand easier. Savannah and local markets quiet. Prices steady. Gum rosin in drums per 100 pounds net in car lots, f.o.b., Savannah; B, $6.50; G, H, I, K, $7.72. Wood rosin per 100 pounds net, car lots, f.o.b. Savannah; B, $5.00; FF, $6.50.

### Rosin Size

Heavy demand. Supply good. Seventy percent gum and pale wood grades, tank cars, $6.30 to $6.40, f.o.b. southern shipping point.

### Salt Cake

Supply somewhat easier. Heavy kraft production keeps demand steady. Production under contract. Domestic salt cake quoted at $25 to $28.

### Soda Ash

Supply continues to improve. Deliveries close to schedule. Current prices sustained in some 1949 contracts. Current prices, car lots per 100 pounds; in bulk, $1.15; in paper bags, $1.40; and in barrels, $1.90.

### Sodium Bicarbonate

Production good. Demand eased by better supply of other alkalis. Reported as $1.93 per cwt. paper bags, carload lots.

### Starch, Corn

Prices look firm following a 50c drop. U. S. record crop brings world production to a record total. Demand moderate. Pearl grade quoted at $5.41 per 100 pounds; powdered starch at $5.52 per 100 pounds; car lots, New York.

### Starch, Potato

Dip in corn starch prices reacts on potato. Idaho now near cost basis and firmer. Maine still unsteady. Demand good and improving. High grade quoted at $4.45/$4.50 cwt. f.o.b. Idaho; $4.75/$4.95 f.o.b. Aroostook; Pearl grade $4.60/$4.80 cwt. f.o.b. Aroostook.

### Sulphate of Alumina

Demand increased. Supply steady. The commercial grades are quoted from $1.50 per 100 pounds, in bags, car lots, f.o.b. works. Iron free is $2.50 per 100 pounds in bags, car lots, at works.

### Sulphur

Demand active. Supplies steady. Production up 3 percent. Annual contracts are quoted at $18 per long ton, f.o.b. mines; the price f.o.b. at Gulf ports is $22.00 per long ton.

### Talc

Demand continues in excess of supply. Improvement seen by early 1949. Prices steady. Domestic grades are currently quoted at $23 per ton in paper sacks, f.o.b. mills; Canadian at $35 and up per ton. All prices in car lots.

### Tapioca Flour

High grades in fair supply. Steady improvement in buying noted. Superior highs range from $10.25/$11.50 cwt.; high grades $9.25 cwt., on dock Atlantic and Gulf ports; medium grades range from $6.00/$7.50 cwt., on dock N. Y. Coarse pearl grades, $5.00/$5.50 cwt., on dock N. Y. Medium and low grades in adequate supply.

### Titanium Dioxide

Supply of paper grades continues unequal to demand. Shipments on allocation. Improvement in supply due early in 1949. Anastase 18c pound carload lots, 18½-19c l.c.l., rutile, 20c pound caload lots, 20½-21c l.c.l.; 50-pound bags, f.o.b. plant, minimum freight allowance.

## Alloy Advances Johnson

LINDEN, N. J.—H. E. (Hugh) Johnson has been named as sales manager of the Alloy Steel Products Co. He was formerly district manager of the Chicago office.

# Obituary

*James P. Blalock,* 47, traffic manager of the West Virginia Pulp & Paper Co., Charleston, S. C., died in a local infirmary on November 4. Surviving him are his widow, Mrs. Bertha Coward Blalock; two sons, J. P., Jr., and Wm. N.; two sisters, Mrs. D. W. Smith and Mrs. T. M. Herndon; and two brothers, A. J. Blalock, Jr., and W. D. Blalock.

*Douglas C. Barry,* 56, vice-president and general manager of the Lathrop Paper Co., Inc., Newark, N. J., and New York City, died at Overbrook Hospital, Summit, N. J., on November 5, following an operation. Surviving him are his widow, Mrs. Lois Donaldson Barry; three daughters, Jane, Ann, and Mrs. Lois Lincoln.

*William E. Nash, Sr.,* 67, former sales manager of the Nekoosa-Edwards Paper Co., Port Edwards, Wis., died at his home in Wisconsin Rapids on October 19. Survivors include his mother, Mrs. L. M. Nash, a son, William E. Nash, Jr.; three brothers, Charles, George and Neil; and a sister, Mrs. Isabelle Mullen.

*Michael Gidwitz,* 68, president of the Lanzit Corrugated Box Co., Chicago, died in that city on November 9. Mr. Gidwitz' son, Victor E., is secretary-treasurer of the firm and his nephew, Joseph L., is vice-president and sales manager.

*William A. Stuiber,* Sr., 67, a salesman for the Winne Paper Co., New York City, died at his home in Plainfield, N. J., on November 4.

*William H. Scott,* 60, purchasing agent at the White-Corbin division of the U. S. Envelope Co., died in Springfield, Mass., on November 9.


salt cake

98%-99% PURE

Available from Saskatchewan Mineral's new natural sodium sulphate plant at Chaplin, Saskatchewan.

- Independent analysis give purity in EXCESS of 98% (figures and sources on request).
- Productive capacity at peak, 150,000 tons per year.
- RELIABILITY OF DELIVERIES:
  1—Large stock pile of raw salt.
  2—Storage facilities at plant for several thousand tons of salt cake.
  3—Location directly on main trans-continental line of Canadian Pacific Railway assures uninterrupted service.

*Complete information and prices on request to:*

Saskatchewan MINERALS

Sodium Sulphate Division

REGINA • SASKATCHEWAN


## Dividends Declared

*(Continued from page 131)*

of record on November 13. Ben O. Anderson, treasurer, was elected a member of the board of directors, replacing E. L. Saberson, a vice-president, who plans to retire in the current fiscal year.

*U. S. Playing Card Co.* has declared an extra dividend of $1 and the regular quarterly of 50 cents on its common, both payable January 1, 1949, to record December 16, 1948. An extra dividend of 50 cents was paid January 1, bringing total disbursements this year to $5 compared with $4 in 1947.

*Electric Machinery Mfg. Co.,* Minneapolis 13, Minn. Booklet, #200-TEC-1077, "Power Factor and What to Do About It." Explains the essentials of power factor in industrial plants and gives a digest of p.f. calculation, why low p.f. should be corrected and how it can be done.

*Corrugated Paper Box Co.* (Canada) has declared a dividend of 25 cents per share on its common stock and $1.25 per share on its preferred, payable December 1, 1948, to shareholders of record November 12.

*Hinde & Dauch Paper Corp.*—Nine months: Net profit, $3,194,743, or $6.71 a common share, against $3,239,026, or $6.79 a share, last year.

*Dixie Cup Co.*—Twelve months to September 30: Net profit, $1,716,279, or $6.26 a common share, against $1,-416,959, or $4.79 a share, for twelve months to September 30, 1947.

*St. Regis Paper Co.* has declared a regular quarterly dividend of 15 cents per share on the common stock, plus an extra dividend of 10 cents per share, both payable December 1, to stockholders of record November 5.

The company reports net sales for the nine months ended September 30, 1948 at $123,416,387, compared with $103,953,481 for the corresponding period of 1947. Net income, after provision for Federal taxes, for the first nine months of this year amounted to $12,048,192 against $11,055,144 for the like period of last year.

*Champion Paper & Fibre Co.* has declared a dividend of 50 cents per share on its common stock, payable December 1 to holders of record November 10. This brings payments on the issue to $2 a share this year. A total of $1.25 was distributed in 1947. The board also declared the regular quarterly dividend of $1.12½ on preferred stock for payment January 1 of record December 15.

*Haloid Co.*—Net income of $346,552, equal to $2.45 a share on the common stock for the first nine months this year, compares with $72,703, equal to 51 cents share, for the period in 1947.

*Hinde & Dauch Paper Co. of Canada, Ltd.*—Has declared a dividend of 25 cents per share on its common stock payable on January 2, 1949, to shareholders of record on November 30, 1948.

*Eddy Paper Co., Ltd., of Canada,* has declared a quarterly dividend of 25 cents per share on the outstanding Class "A" shares of the company, payable on December 15, 1948, to shareholders of record of November 15.

*Abitibi Power & Paper Co., Ltd.,* has declared a dividend of 37½ cents per share on its $1.50 preferred stock and 62½ cents per share on its $2.50 preferred, both payable on January 1, 1949, to shareholders of record on December 1, 1948.

*Great Northern Paper Co.*—An extra dividend of 80 cents and the regular quarterly of 50 cents has been ordered for payment December 1 by the Great Northern Paper Co., bringing total disbursements this year to $2.80, or 40 cents more than in 1947.

*Consolidated Paper Co.*—Extra dividend of $1 on its common stock, payable December 1 to stock of record November 20. The regular quarterly dividend of 25 cents declared September 30 also is payable December 1. A similar extra was paid a year ago.

*Crystal Tissue Co.* — Nine months: Net profit, $181,457, or $1.79 a common share, against $186.878, or $1.85 a share last year; net sales, $3,584,162, against $3,594,116.

*American Writing Paper Corp.* Net loss for the first nine months of 1948, after all expenses, was $101,382.98. This compares with a net profit, after all expenses, of $465,873.07 in the corresponding period of 1947. For the third quarter of 1948, after all expenses, the net loss was $69,363.45. During 1947 for the same period, the net profit transferred to surplus was $92,245.50.

*Rayonier Inc.* Nine months ended September 30, 1948. Sales of $47,315,433. Net income, $7,658,443 representing $6.76 earned per share of common stock. This compares with sales of $36,746,539 and net income of $6,083,795 or $5.18 per share, for the first nine months of 1947. The consolidated balance sheet as of September 30, 1948, shows current assets of $20,666,360 and current liabilities of $6,275,171.

*Whitaker Paper Co.* on October 23 declared a dividend of $1 per share on stock, payable December 27, to stockholders of record at the end of business on December 13. This makes a total of $4 in dividends paid by the firm this year. Dividends of $1 per share were paid April 1, July 1 and October 1.

*S. D. Warren Co.* declared a dividend of 35 cents per share on its common stock, payable December 1 to holders of record November 13, and a dividend of $1.13 per share upon the $4.50 cumulative preferred stock, payable also December 1 to holders of record at the close of business November 13.

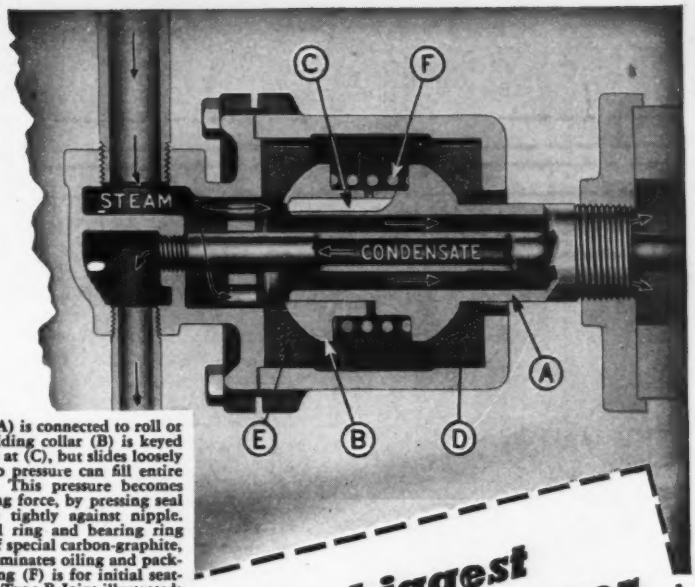
*Barber-Ellis of Canada Ltd.*, wholesale paper dealer and manufacturer of envelopes and stationery, declared a dividend of 25 cents per share on its common stock, plus a bonus of 12½ cents per share, payable on December 15 to shareholders of record on November 30, 1948.

*Nekoosa-Edwards Paper Co.* — Nine months: Net income, after $450,000 provision for plant, was $1,709,305, or $5.43 a share, against $2,123,775, or $6.74 a share last year; net sales, $14,906,923, against $13,203,105.

*Rayonier Inc.* has declared the regular quarterly dividend of 50 cents per share on the $2 cumulative preferred stock, payable January 1, 1949, to stockholders of record December 17, 1948.

*MacLaren Power & Paper Co., Ltd.*, declared a dividend of 25 cents per share on its common stock payable on January 3, 1949, to shareholders of record on November 6, 1948.

*Soundview Pulp Co.*—Nine months: Net income $4,367,149, or $4.47 a share, against $4,640,237, or $4.71 a share, last year.


Nipple (A) is connected to roll or drum. Sliding collar (B) is keyed to nipple at (C), but slides loosely over it so pressure can fill entire housing. This pressure becomes the sealing force, by pressing seal ring (D) tightly against nipple. Both seal ring and bearing ring (E) are of special carbon-graphite, which eliminates oiling and packing. Spring (F) is for initial seating only. Type B Joint illustrated; other types, sizes for all needs.

**...it's the biggest little trouble-saver in the mill...**

In terms of physical size alone, the Johnson Joint could hardly be called big machinery. But in its ability to save time and trouble, and promote plant efficiency, its stature approaches anything the industry has ever seen.

The Johnson Joint was designed to go after the old stuffing box and steam fit troubles in a business-like way, and it literally knocks the stuffing out of them. There's no packing of any kind. There's no oiling required, ever. There's no adjusting — the higher the pressure, the tighter the seal. There's little to fear from misalignment—with provision for both lateral and angular movement built right in. Note besides how neatly it provides for more efficient syphon drainage, through the same head that admits the steam.

In dollars and cents, what does all this add up to? Well . . . enough at least to pay the cost of switching over to Johnson Joints in just a short while. Enough certainly to make the Johnson Joint too big to overlook.

Write for literature and the name of your nearby Johnson representative.

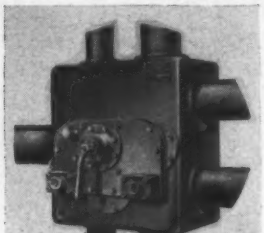
JOHNSON
*Rotary Pressure*
JOINTS

THE JOHNSON CORPORATION
828 WOOD STREET
THREE RIVERS, MICHIGAN

# Equipment & Supplies

## Hydromatic Valve Control

The Hydromatic Valve is designed as a single control valve for the simplified operation of all types of zeolite softeners, ion exchange systems and pressure filters. With pressure filter installations, it can adapted to oper-



ate with various types of chemical feeding systems or for actuation of filter agitators. Also available for demineralizing systems or for ion exchange systems in process applications.

A six-position valve with four normal operating positions and two standby positions, it is announced as standard equipment on the manufacturer's line of zeolite softeners and pressure filters. In addition to integrating the function normally performed by a valve nest, the Hydromatic Valve incorporates such features as built-in backwash and rinse rate controls. In the control of zeolite systems, operating positions provide separate control of backwash, regenerant feed, rinse and service. In the control of pressure filters, a fourth position is provided for actuating such devices as a filter agitator or a filter aid or pre-coat type of chemical feed. Two standby positions are accommodated by the hydromatic valve. In one, the container being serviced is completely isolated from service lines. In the other, the container may be drained to bed level for inspection. Operation of the Hydromatic Valve has been simplified to make it suited to manual or automatic control. It is pilot-actuated, power for operation of the valve member being provided by the raw water itself. Designed for operation with the pilot device, a number of flexible bellows valve members control the various functions. For details and prices, write to Cochrane Corp., 17th street & Allegheny avenue, Philadelphia 32, Pa. In Canada, address Canadian General Electric Co., Ltd., 212 King street West, Toronto 1, Ont.


# deoxidant

The use of "Virginia" Liquid Sulfur Dioxide ($SO_2$) after peroxide bleaches such as the Solozone process will adjust the pH and remove the oxygen. This is effective in stabilizing the bleach and preventing color-reversion. "Virginia" $SO_2$—sold under our trade-name of Esotoo—is 99.98+ percent pure. It is available for prompt delivery in any quantity, in cylinders, drums, or tank cars.

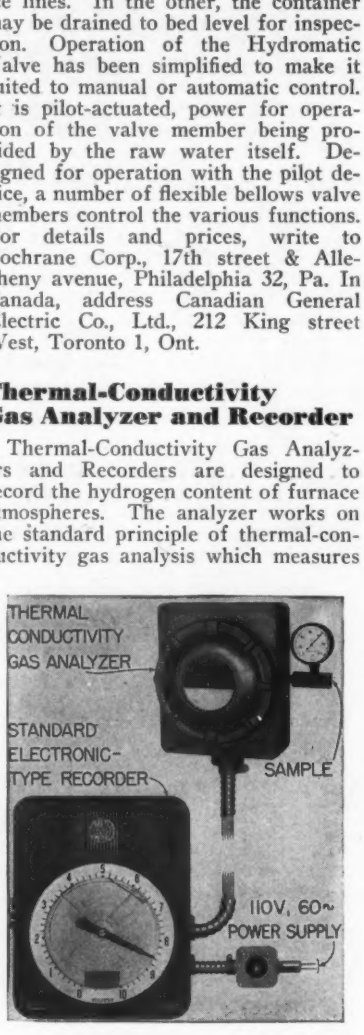
●

**Send for descriptive literature on "Virginia" Liquid Sulfur Dioxide. Write Virginia Smelting Company, West Norfolk 3, Virginia.**

VIRGINIA
Liquid Sulfur Dioxide


## Thermal-Conductivity Gas Analyzer and Recorder

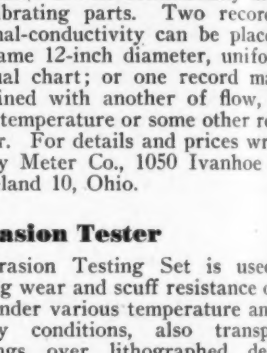
Thermal-Conductivity Gas Analyzers and Recorders are designed to record the hydrogen content of furnace atmospheres. The analyzer works on the standard principle of thermal-conductivity gas analysis which measures




the rate at which heat is conducted by the gas being sampled. Mounted in an explosion-proof case, the analyzer is said to be unaffected by voltage variations, ambient temperature, and variations in sample pressure. An all a-c circuit permits the use of a standard Bailey Electronic-Recorder which does not require dry batteries or a standard cell. Manufacturer states that the new analyzer is unusually stable, fast in response, and requires no manual attention or adjustment except for routine maintenance. The electronic recorder measuring circuit employs an a-c potentiometer which operates on the highly accurate null balance principle. Voltage drop accross sample cell of the analyzer is automatically balanced against the voltage drop across a motor-driven slidewire unit in recorder. Recording pen is connected to the slidewire. Any unbalance re-positions the pen to record in terms of the factor being measured. Recorder employs electron tubes instead of a galvanometer so that there are no continuously moving or vibrating parts. Two records of thermal-conductivity can be placed on the same 12-inch diameter, uniformly-gradual chart; or one record may be combined with another of flow, pressure, temperature or some other related factor. For details and prices write to Bailey Meter Co., 1050 Ivanhoe road, Cleveland 10, Ohio.

## Abrasion Tester

Abrasion Testing Set is used for testing wear and scuff resistance of paper under various temperature and humidity conditions, also transparent coatings over lithographed designs, etc. It incorporates a rotary abrad-



ing action of a four-inch specimen, the wear resulting from alternately rubbing the flat faces of two resilient Calibrase wheels over the surface being tested. A range of standardized abrasive wheels are available for testing all types of surface finishes. Features include improved suction pump with vertical dust receiver with swinging nozzle fully adjustable for any thickness specimen. Since different materials require a varying degree of suction cleaning while being tested, control unit is equipped with a built-in variable transformer for adjusting speed for the suction turbine motor. Control panel also is equipped with adjustable timer to provide a test period of 1000 cycles or less and then automatically shutting off the power. Switches on front of control panel provide combination of operating conditions such as, with or without vacuum pickup, continuous operation without timer, or any timing up to 15 minutes. Control unit comes equipped for dual

operation so that an additional Abraser unit can be located beside and connected with the control unit, thus permitting two specimens to be tested simultaneously using the same controls and vacuum unit. Three testing sets are offered, each complete with parts and supplies for various types of testing. For details and prices, write to Taber Instrument Corp., 111 Goundry street, North Tonawanda, N.Y.

### Nopol

Nopol, another organic compound, is described as a new "bicyclic primary alcohol" produced by condensation of beta pinene and formaldehyde. Available in drum quantities or less from pilot plant production for chemical experimentation and development. Manufacturer terms the substance the only primary alcohol derived from the terpenes which is potentially available in large volume at low cost. For details and prices write to E. W. College, G.S.A., Inc., Jacksonville, Fla., or Glidden Co., Union Commerce Bldg., Cleveland, Ohio.

### Board Meeting Deferred

NEW YORK—The board of directors of the National Paper & Type Co., recently deferred the date for the holding of the annual meeting of stockholders from November 17, to November 30, in order to prepare the necessary data.

### Pattison Featured Speaker

SPRINGFIELD, Mass.—Robert W. Pattison, president of the Cellulose Fibres, Inc., Holyoke, addressed a meeting of the Eastern Paper Mill Suppliers Ass'n., at Hotel Sheraton on November 10, on new developments in papermaking.

### Quinlan TAA Director

NEW YORK—J. A. Quinlan, vice-president of the St. Regis Paper Co., has been elected a director of the Transportation Ass'n., of America.

### Searle Plant Manager

MOBILE, Ala. — Robert F. Searle has been appointed plant manager of the local multiwall bag plant of Arkell & Smiths.

### Garage and Trucks Burn

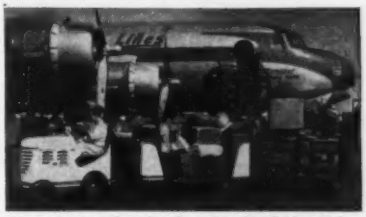
KALAMAZOO—Fire destroyed a garage and 16 trucks belonging to the Sutherland Paper Co., on November 9. Loss was estimated at $100,000.

### WITH FIRM 50 YEARS

Richard L. Quinn, manager of the Philadelphia office of the Geigy Co., Inc. (New York), completed 50 years of service with this Geigy affiliate in October.

## MATERIAL HANDLING News

In no other phase of plant operation," says the production head of a leading corporation, "are opportunities for savings in costs so great as in Materials Handling."



*Time required to load and unload planes has been cut to a minimum by the Clark Method.*

There's no surer way to develop those opportunities into golden realities, exploiting them to the last penny, than by using Clark fork-lift trucks and towing tractors. By replacing old and expensive handling operations in factories, in warehouses and on docks, Clark methods and machines are achieving up to 50 per cent reductions in handling costs—usually representing one-third to one-half of total production cost!

*Think of the time saved in loading highway trucks, compared to old-fashioned methods!*


# THESE BUSINESS-LIKE TOOLS do a business-like job THAT BUSINESS LIKES

As a guide to realization of your own opportunities, investigate these business-like tools that are doing a business-like job that Business likes. You'll find, as we've been happy to find, that users of Clark machines are their most outspoken admirers—that they swear by them because they're really good.

*Scrap-disposal is done by means of Clark trucks in a fraction of the time formerly required.*

A talk with a Clark field representative will reveal how businesses in your line are making substantial additions to profits by using the Clark Method. It pays—often impressively—to CONSULT CLARK.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 58, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

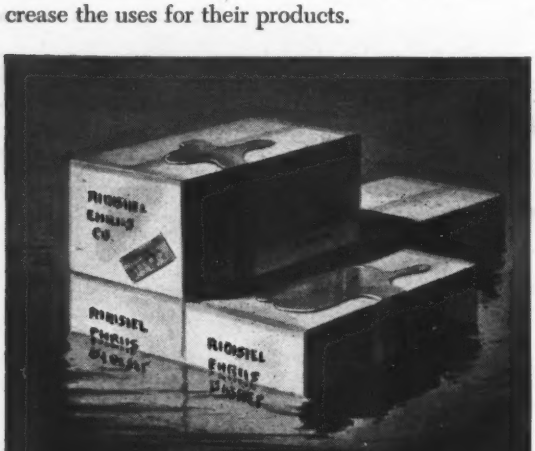
THE NATIONAL GUARD DEFENDS AMERICA — JOIN NOW

# Paper Product Pointers
FROM CYANAMID

*Re: Wider Markets for Paper...*

# ALWAX SIZES MAKE PAPER WORKABLE ...WATER-RESISTANT

Weather and climate have less effect on paper properly treated with ALWAX** Sizes. Papers ranging from fine envelope stock to heavy paper board grades benefit by the application of ALWAX Sizes. That is why more and more manufacturers are turning to these Sizes to improve paper quality and increase the uses for their products.



Water isn't wet enough to damage paper containers properly treated with ALWAX Sizes.

ALWAX Sizes may be used to supplement rosin size for maximum water resistance.

When applied at the beater, ALWAX Sizes improve lactic acid resistance as well as impart high water resistance at low cost. They enhance finish and folding qualities and give a better printing surface with less chance of "offset". They reduce misregister on printing under varying humidity conditions.

At the tub or calenders, ALWAX Sizes produce high surface water repellency and improve finish. They impart smoother printing surfaces, give scuff resistance to such products as wall board and box board, assure uniform calender dyeing, and give resistance to blood penetration—important in butcher wrap.

Cyanamid has developed a variety of ALWAX Sizes to meet a wide range of paper making needs and is prepared to originate others to meet special requirements. In addition, a *complete* line of paper chemicals is available from Cyanamid to serve the paper manufacturer.

**ALWAX** Sizes • **WAXINE*** Sizes • Rosin Size • **PAREZ*** Resins Synthetic Resins • Casein • Alum • Sulfonated Oils • Fillers Defoamers • Soda Ash • Caustic Soda • Salt Cake • Acids • Clays **AEROSOL*** Wetting Agents • **CAL MICRO**** (Calcium Carbonate) and other Paper Chemicals.

*Reg. U. S. Pat. Off. **Trade-mark

*Sales Offices:* Boston, Mass.; Philadelphia, Pa.; Pittsburgh, Pa.; Baltimore, Md.; Charlotte, N. C.; Cleveland, Ohio; Cincinnati, Ohio; Chicago, Ill.; Detroit, Mich.; Kalamazoo, Mich.; St. Louis, Mo.; Los Angeles, Calif.; San Francisco, Calif.; Seattle, Wash. In Canada: Dillons Chemical Co. Ltd., Montreal and Toronto.

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INDUSTRIAL CHEMICALS DIVISION
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SECTION OF THE

TECHNICAL ASSOCIATION
OF THE PULP AND PAPER INDUSTRY

122 E. 42nd ST., NEW YORK 17, N. Y. *Edited By* R. G. MACDONALD, *Secretary*

# Features of an Eight-Cylinder Board Machine*

By C. Ives Gehring[1]

## Abstract

*A description of a cylinder board machine manufacturing solid board specialties is given.*

Single lined, double lined, and solid board specialties for paper food containers and closures are made on an eight-cylinder, 91-inch board machine. The grades vary in caliper from 0.0125 to 0.055, and include sidewall stock for single and multiple wall containers, can cover and end boards, bottle cap plug, and disk stock. In general they are strong, hard, stiff sheets with high density, well sized, maximum ply adhesion, and top quality printing surfaces. The liners are especially well formed and dense preventing filler show-through after waxing.

Typical furnishes have bleached or unbleached sulphites or kraft for liner, and sometimes bleached soda is used on light weights. The filler generally contains unbleached sulphites or kraft, groundwood, and varying amounts of mill converting waste that is satisfactory in character and quality.

Stock preparation includes hydrapulpers, beaters, cycling chests, and jordans. The beaters are essentially used as breakers, the rolls have stagger bars, carried high, with no bed plates. The present hydrapulper is on filler and shortly another unit will replace the remaining beaters. Hydration is by a hydrafiner and a cycling chest on liner, and a cyclifiner and cycling chest on filler, all batch method. If the filler contains groundwood, its addition is always after the chemical or raw fiber has had the necessary degree of refining. However, groundwood is always subject to jordaning which is sometimes unfortunate on certain sheets.

These brief remarks about the type of boards, the fiber furnish, and the treatment, together with the properties of the board, permit all to have a little more fundamental knowledge and understanding of the machine and its operation that is to be discussed.

## Machine Construction

The machine has a three-system stainless steel machine stuff box, equipped with a gate for each of the eight vats. This permits maximum flexibility in distribution of the liner, filler, and underliner. Both liner and underliner or 3rd system have sufficient capacity to handle double lined grades individually. It also provides maximum opportunity to change from bleached lined to kraft lined or vice versa with loss time and production limited to cleaning liner screen mixing box and vat. Unless the character of the boards and their caliper are extremes only a matter of minutes is required to change.

Each vat has an individual 12-plate, 18 to 20 cut, flat screen driven by individual motors, belt connected. Motors are 5 h.p., but only about 3 to 3.5 h.p. is drawn. There is ample screening capacity for any reasonable increase in production. The flow from the screens to mixing box to vat inlet is all by gravity. The entire piping of the wet end, beater and machine room systems is of stream-lined copper. It is essential in making boards for paper food containers to reduce the results of metal corrosion and dead pocket accumulations to the irreducible minimum.

The cylinder vats are of counterflow design, 36-inch-diameter cylinders, and the so-called making or forming area between the vat inlet and cylinder face together with the distance between the vat circle and cylinder face are all on the short side. It is believed that this is essential where chemical and groundwood fibers are used in combination. It is also believed that it is one of the underlying fundamentals why a very outstanding bottle cap plug stock is produced with the ability to make a stiff, rigid sidewall stock with the fiber furnish, that has been given.

The cylinders have stainless steel rods, winding wire, backer, and face. A composition rubber and cloth deckle is used, sewed on with wire at every opportunity, rather than stapled. It has been found that wire life is limited to not over 3 years when staples are used since the edges of the face are punched full of holes before full life of the wire has been used. The showers are all on white water and while they are of an automatic selfcleaning design, they are operated manually.

The machine has a long bottom felt (140 feet) and a short top felt (70 feet) layout. Bottom felt travels over eight cylinders and then up and around a suction drum press, back through three primary presses, a suction primary, and the 1st press. The top felt comes in at the suction drum press nip and continues only through the 3rd primary press. This leaves the top side of the sheet bare through the suction primary and 1st press. Both felts have oscilating nozzle conditioners with steam and water combination that can be altered, but usually they operate at 100 pounds. The felt showers are arranged so that the value of a penetrating shower ahead of whipper and a flushing shower after the whipper is obtained. Both felts have a 10-inch suction roll carrying about 3 to 5 inches of vacuum, following the washing equipment and conditioners. Outstanding performance from these, both from results and maintenance, has been obtained.

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The cylinder couches have about 1¼ to 1½ inches of wall thickness, density of zero, and a plastometer reading of from 225 to 250. An attempt is always made to run the thin walled and low plastometer reading rolls on the last cylinders, providing the initial ones with maximum cushioning. Under these conditions for the 91-inch trim machine, about 0.025 crown is maintained.

To repeat, the bottom felt after the cylinders goes up and around the suction drum press located just above and over No. 8 cylinder, this provides maximum wrap. The three primary presses following are located over Nos 7, 6, and 5 cylinders. All rolls high enough to permit easy change of cylinders. The suction drum press usually has a vacuum of 24 to 26 inches, obtained from a No. 8 Nash with a 75 hp. motor. The rubber top rolls of the press have a density of 4⅞ and a plastometer of 45 to 50.

The crown here is about 0.038. The three primary presses are rubber covered with density running about 5¼ to 5⅜. Their plastometer reading varies from 10 to 30 which is too great a variation. Were new rolls to be obtained or a recover job, a 25 to 30 reading with the top rolls about 30 and the bottom rolls 25 would be desired.

All the bare rolls of the suction primary and the three main presses have oscillating doctors. The top roll of the suction primary has a density of 5⅛ and a plastometer reading of 38. There is reason to believe that this is too high for this position, it should be about 10. The wall thickness being dependent on whether it be a bare or felt nip. However, no noticeable fault has been observed and this press is really weighed. The crown runs about 0.038. All main presses are brass top and rubber bottom rolls, top rolls straight and the bottoms crowned. The rubber rolls have a density of 5¾ and a plastometer of 10. It is believed that this could be dropped to as low as 5.

The vacuum for the 20-inch suction primary is obtained by a suction pump No. 8 with 40 hp. connected. About 18 to 20 inches on this roll is maintained. A No. 7 vacuum pump with 40 hp. connected produces the vacuum for the felt conditioners and suction rolls of the wet felts.

The suction pumps for each cylinder are all connected on a single line shaft driven by a constant speed steam turbine. The pumps have just been renewed and now run at 900 r.p.m. with 1200 g.p.m. capacity. They formerly were 600 r.p.m. and 900 gallons. The old turbine was a 75 hp. and the new one is 125 hp. The turbine horsepower is more than ample but it also drives two small generators. One generator produces current for the magnetic clutches. The other drives the electric motor on the oil pump of the variable steam turbine driving the machine. This so-called auxiliary equipment insures a machine being kicked out on electric failure or interruptions. Electric failure will of course shut all electric motors down, but the wet end, driers, and reels stopping under full load is eliminated.

The entire wet end driven by the 1st press is equipped with an electric helper drive. This materially helps the use of felts built for water removal and finish. It reduces the felt requirements as a transmission belt. It would take quite a heavy felt to pull the weight maintained on that bottom felt. Essentially, the system includes a main generator mechanically connected to the variable speed line shaft just beyond the 1st press pulley. This produces the current for the helper motors. Voltage output from this increases or decreases practically instantaneously with machine speed.

All motors are compound wound, force ventilated, water proof enclosing covers. Each of the cylinder molds have directly coupled to its back shaft a 2 hp. —230 volt motor. The bottom roll of the suction drum press has a 7.5 hp.—230-volt motor. The motors on the bottom rolls of the primary presses are 7.5 hp. and the top roll of the 1st press has a 5 hp.—230 volt motor.

Each motor is provided with a small individual control panel including an ammeter to indicate its load and a manual trim rheostat for adjusting the effort exerted by the motor. An auxiliary a.c. driven exciter MG set provides the excitation for the complete wet end drive. There is also a main control board to alter the speed of the entire wet end simultaneously. The force air ventilating system is a ¾ hp., 1750 r.p.m., three phase, 60 cycle, 220 volt motor.

Stretch readings are regularly taken between each nip of the bottom felt with a felt measuring wheel. A sheet is made up as a standard with circles representing the various rolls and the operator fills in the circle with the length of felt for each complete revolution of the felt at any of the nips. It is not desired to have an excess of 2 foot total stretch for the 140 feet bottom felt when bottle cap, 0.040, is being made. The individual control boards permit the total stretch to be distributed evenly and very uniformly throughout the 13 or 14 points of stretch positions.

This just about completes the wet end equipment of the machine. There is little to say of interest of the drier section as this is without question the bottle neck. With the fan pump capacity, screening area, and wet end water removal equipment that has just been given production could be substantially increased with improved drying capacity. However, to make this paper complete, there are 59 4-foot driers operating at 50 pounds back pressure on the machine. The 1st few driers are operated by flash steam and are usually about 5 to 8 pounds below top pressure. The driers are divided into three sections, and have a Midwest Fulton hot air drying system with a hood and four exhaust fans. There are three calender stacks, two reels, and a winder capable of running straight or reverse.

# Developments in the Graphic Arts—1946-1947*

By Robert H. Simmons[1]

In studying the trade journals for developments in the graphic arts during 1946-1947, it was found that many of the items listed as new have already been reported in past issues of "Developments." An attempt has been made to include only new information, but in some cases considerable additional information on former reports has been included.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Commodore, New York, N. Y., Feb. 23-26, 1948.

[1] Member TAPPI; Chairman, TAPPI Graphic Arts Committee; Chemist, Government Printing Office, Washington, D. C.

## Paper

Developments in the paper industry seem to be more in the coating field. Eastman Kodak Company are producing two papers; Kodak Resisto and Resisto Rapid, for industrial and graphic arts photographers, which are treated with an acetate that permits the paper to shed water. This enables photographers to produce true-scale copies and reproduction in a very short time. Development requires approximately 1 minute, fixing 2 and washing only 4 *(1)*.

Arthur K. Doolittle has assigned patent U. S. 2,391,619 to the Carbide & Carbon Chemical Corporation for a method of treating paper by which an increase is obtained in gloss, resistance to abrasion, moisture, oils, fats, alkalies, and acids. The paper is coated with a vinyl resin and subjected to a flash baking of 5 to 20 seconds at temperatures of 375 to 400°F. Brittleness of the paper is prevented by carrying out the baking operation in a humidified atmosphere or by rehumidifying the coated paper after baking *(2)*.

A coating which resists penetration of ink and varnish is formed by using a modified aldol type condensation product in conjunction with pigment and casein. The formaldehyde and other aldehydes may be first brought together with the aid of heat and under alkaline conditions of pH 9.0 or above. The reaction is stopped before a resin is formed or deeply discolored. The mixture is then incorporated with the coating composition. Varying degrees of resistance can be obtained by selecting products of varying amounts of condensation. A formaldehyde, acetaldehyde product is preferred. Five per cent on the basis of casein is equivalent to increased ink resistance of 50% casein. Soya bean protein may be substituted for casein with good results *(3)*.

Chester G. Landes assigned to American Cyanamid Company, patent U. S. 2,399,489 on a coating composition in which a synthetic resin is incorporated into the composition. A pH of 4.0 to 7.0 is used. The resin is a member of the group consisting of an acid-curing urea-formaldehyde and melamine-aldehyde condensation product. An acid-curing catalyst is used and starch in place of casein *(4)*.

Urea-formaldehyde condensation products are used together with starch in a new paper finish. The reaction is brought about by the addition of an alkali silicate from the sodium metasilicate groups. (U. S. patent 2,385,438). An advantage of the new coating is that it may be used as an adhesive and a clarifier as well as for other purposes *(5)*.

Frank W. Egan believes that magazines and newspapers will soon all be printed on machine coated paper. With the numerous reports that most newspapers will be printed in color, this is not an idle prophecy *(6)*.

In an article on the use of melamine resin in paper-coating raw stock, R. W. Kumler reports that the resin produces a better wet and dry strength than the untreated paper. It also improves the wet and dry resistance to rubbing, improved rosin sizing, and better dimensional stability. Folding quality and wax pick test are increased. The quantity of size necessary for a given sizing effect is reduced by the use of melamine resin *(7)*.

The use of silicone resins for sizing paper in the beater has been studied by C. J. Bergendahl and C. E. Libby. Interesting results have been obtained. A very low resin content can give good results when distilled water is used. A hard water reduces the effect. It is stated that sizing was obtained at a pH below 7.0 *(8)*.

R. H. Mosher has pointed out that synthetic resins which have normally been added to paper in separate operations can be added on the paper machine. He mentions the places where the resins can be added and the various resins which can be used *(9)*.

The *Printing Equipment Engineer*, for August, 1946, pages 66 and 72, has two ideas which apply to the graphic arts, especially the papermakers. The first is that any changes in the furnish for a paper should be given printing tests before placing the product on the market so that the printer can be assured of good operations. Any changes which should be made in the ink necessary to print on the paper should then be relayed to the printer because, to a great extent, the printer relies on the papermaker for a paper that allows the printer to operate smoothly and economically.

The second idea follows along the same line, except that it is for coated papers. *Printing Equipment Engineer* feels that considerable research is necessary for litho-coated papers. An acid coating slows drying while an alkaline coating upsets the pH of the fountain solution. *Printing Equipment Engineer* feels that the co-operation should include the papermaker, ink maker, and the printer. The problem links the pH of the paper, ink, and fountain solution, and relates them to the surface chemistry of the metal plate *(10)*.

The National Bureau of Standard has published a bulletin, "Notes on Resin Bonded Wet Strength Papers," in which it reports on paper used for military maps which can be laundered like cloth, boiled in soapy water, and ironed flat. It is now used for paper cord, rug backing, garbage disposal bags, frozen food cartons, building products, and veneer backing *(11)*.

Paper tape properly treated either by an iron base substance which is ready for magnetization or with a coating containing a powdered ferro-magnetic material is finding use in recording *(12)*.

An automatic sheet collator has been developed by Dager Automatic. The machine will handle sheets in sizes 7 by 8½ inches to 10 by 14 inches, in substances from 9 to 28 pounds. Collation is in duplicate or triplicate at the rate of 3,000 sets per hours *(13)*.

## Printing Ink

Developments in this field seem to be in the nature of utilization of new raw materials. There has been a lot of information on heat-set, steam-set and pliolite inks.

The Mead Corporation of Chillicothe; Ohio, has announced the production of "Meadol" an alkali lignin derivative from hard woods, which exhibits promise for use in plastics, inks, paints, emusions, and other products wherein a low cost colloidal material is required *(14)*.

A stable zein solution can be prepared by dissolving zein in a water-miscible solvent, together with a water-soluble thiocyanate. The thiocyanate retards the increase in viscosity of the solution upon standing. The solvents recommended are acetone and ethanol *(15)*.

U. S. patent 2,401,898 was signed by Isadore Bernstein to the H. D. Roosen Company for an ink suitable for printing soap wrappers. The ink binder consists of a courmarone or indene resin dissolved in a resin modified drying oil comprising the esterification products of poly ethers of pentaerythritol higher than the diether with a drying oil being present in proportions to form a stable solution of the resins when cold. The addition of suitable pigment forms a printing ink having soap-resistant qualities *(16)*.

Dominic J. Bernardi and Robert T. Florence obtained U. S. patent 2,416,676 on the use of a hydrated lime-treated tall oil in an ink which would normally use lin-

seed oils. The tall oil substitute apparently gives as good printability and drying time as the linseed oil inks *(17)*.

Burrell and Bowman have obtained U. S. patent 2,390,000 on a method of preparing a synthetic drying oil by heating unsaturated monocarboxylic higher fatty acids such as linoleic, oleic, etc., with polypentaerythritols, either alone or in the presence of an inert gas such as carbon dioxide, an esterification catalyst such as lead oxide or sulphuric acid, or in the presence of an inert solvent *(18)*.

Innis, Speiden & Company have announced two carnauba wax substitutes; namely, Carnauba Wax No. 352 and Refined Vegetable Wax No. 717. The former has a melting point of 178 to 180°F. and can be used in carbon paper and paste wax to replace carnauba *(19)*.

Joseph G. Curado, U. S. patent 2,382,861, has developed an ink for printing by typewriter on moisture-proof cellophane The ink is prepared by acidifying carbitol acetate with acetic acid to a pH of 3.03 and then dissolving from 15 to 40% of a dye base in the solvent. Pigment is then added and ground in a ball mill. The ink gives a clean-cut, dense opaque impression *(20)*.

The printing ink manufacturers have produced a series of inks which are recommended for four-color and two-color printing.. The advantage of these inks is that they are even driers across the sheet and do not lose their gloss on drying, but stay on top of the paper. These inks are sold under several trade names *(21)*.

In 1945, The F. G. Okie Company introduced a new ink which has come to be known as a class which sets by preferential absorption and works best on casein coated papers. This ink is now being manufactured generally by the ink industry. The rate of setting and drying of this ink is almost instantaneous and can be printed and backed up immediately without the use of anti-offset sprays *(22)*.

Erickson and Elliot reported to TAPPI in February, 1941 on Hy-dri inks. Since that time various developments have been made in the ink. The principle of drying has not changed, but the stability of the ink under high moisture conditions has been improved. Jueck and Reitz have assigned U. S. patent 2,390,102 to Interchemical Corporation for steam-set ink which has good stability under humidity, but which sets good under a steam or water spray. A formula for this ink is included *(23)*.

Kroeger and O'Connor, U. S. patent 2,389,371, claim a steam-set ink for printing halftones. This ink includes the use of pine oil and a monoterpinylethyleneglycol ether to prevent "fill-in" in halftones *(24)*.

The Kessler Chemical Company, of Philadelphia, has found that ethylene glycol 400 diacetate is an efficient stabilizer for steam-set inks *(25)*.

The Chicago Tribune has run steam-set ink on the first impression backed up by an uninked second impression at 35,000 impressions per hour. The first impression offset, normal with most news inks, did not occur. The printing was blacker and sharper *(26)*.

Heat-set inks also have been subjected to revision and improvement. Kroeger and O'Connor, U. S. patent 2,397,019, have developed a heat-set vehicle which consists of a nonresinous, thermosetting liquid condensate of a phenolic compound from the class consisting of monohydroxybenzene and its carbon-alkylated products with formaldehyde. The vehicle maintains its liquidity and chemical composition on standing at normal temperatures, but resinifies into a solid resin when heated to elevated temperatures. Fatty acids are used to neutralize the condensation products *(27)*.

Reitz and Jeuck, U. S. patent 2,390,390, have added a small percentage of a thermoplastic film-forming agent insoluble in the solvent at both low and high temperatures. This material may be a cellulose ether or ester of a resin on prolamine such as zein. The resin prevents the ink from becoming sticky on drying *(28)*.

Ernest D. Lee, U. S. patent 2,409,215, assigned to Interchemical Corporation, has developed a new type of heat-dry ink. It is composed of a coal free, coal resin of the portion which is soluble in hexane and lower saturated hydrocarbons obtained from a resin-bearing coal of the Utah type *(29)*.

Bensing Brothers and Deeney, of Philadelphia, announce a new type of litho ink which makes possible the printing of large solids by lithography without piling too much ink on the rollers. Small reverse type stays open and free from scum, without constant etching. The pH of the fountain can be kept higher than average and the dampeners stay cleaner *(30)*.

Lithographic inks have been normally made in heavy bodies and concentrations, so that the pressman could reduce the ink by hand to the desired body. Today the leading ink makers are producing inks for lithography, having a body which can be placed directly from the can onto the press. These inks are given names which indicate their nature as Redi-lith or Press-ready inks *(31)*.

### Printing Processes

Goss Printing Press have produced the Unitube Press. It is of the unit type of four-page design. Color can be obtained on any or all webs by reversing cylinders or by adding color cylinders at the top of units or by a combination of both methods *(32)*.

R. Hoe & Company has developed a standard black press, pre-engineered to allow for the addition of color cylinders without changing caps, guards, or gearing. This permits printers to add color equipment when needed without the initial outlay. Thus, publishers need not pay initially for color equipment not immediately required but may have the knowledge that the new press is so designed that the necessary parts for any color facilities may be purchased to add to the black press parts *(33)*.

The Sperry Corporation is manufacturing Wright's Automatic wrapping and filling machines, together with a new rotary cutting and creasing unit which can be used in conjunction with a printer. This makes possible multi-color printing, cutting, creasing, and stripping at high speed in a single straight line operation *(34)*.

John G. Mark & Son, New York City, have developed a method for converting letterpress to offset plates. Proofs are pulled on a special proofing paper manufactured from cotton fiber to assure translucency unobscured by fiber or paper texture. Proofs serve as a file for later reproduction. Negatives are made by photographing the proof, using reflected and transmitted light. This overcomes the harsh lighting contrasts which produce the loss of tone usually noted in rephotographing. Work up to 200-line screen can be handled. Enlargements and reductions from letterpress plates can be made. Practically any type of printing can be converted to offset by this method *(35)*.

The Mosstype Corporation has developed a multi-plate mounting and multicolor proving machine. This machine permits the proofing and registering of multicolor plates. When cylinders are prepared on this machine, they are ready for immediate press operation. In the machine is an adjustable impression cylinder. This is geared to the removable plate cylinder and shaft assemblies from any type of aniline press. Single or multiple plates to be mounted are located on the plate cylinder by a dividing head which provides for exact circumferential spacing and straight line horizontal marker that provides

exact alignment of plates across the cylinder. After the impression cylinder has been set for first color, the setting is not disturbed for progressive proofs *(36)*.

E. S. Hole has invented Holite plates. These are very thin thermosetting plastic plates which can be bent around any cylinder. By combining the plastic with synthetic rubber backing, heavier plates can be built up. These plates can be backed with metal, which may be held in position by fastening devices. They may also be attached to a heat-actuated fabric adhesive (Plastron). This fabric is not normally adhesive but, when heated, it becomes adhesive, and sets rapidly, and will hold the plates accurately in register during the longest runs *(37)*.

Milprint, Inc., of Milwaukee, announce Trans-Vision, a method of producing a third dimensional effect in advertising. By printing in reverse on transparent film, sectional views of an object can show both sides of the object. This intensifies the color and gives sparkle and brilliance to the film. Lumarith, 0.002 inch thick, is used because of the dimensional stability *(38)*.

Cebelect is the name given to a molding plastic which is electrically conductive and will eliminate the use of a conductivity coating operation in electrotype plastic molding *(39)*.

The *American Pressman* for June, 1946, described a new press delivered to the St. Louis Dispatch. A 12-unit rotogravure, capable of printing in three sizes; full page tabloid or supplement size in combinations or monotone and color. This press can produce 32 pages of tabloid or supplement in full color on all pages. The latest advances in photoelectric, automatic and remote control register mechanisms as well as full speed splicing devices, together with high speed enclosed ink fountains with circulating ink system have been included.

It is said that color reproductions were printed 13 hours after the color transparencies reached the dark room of the Chicago Tribune. Twenty casts were made of each color and eighty casts to the page *(40)*.

The British have developed a new Lagonda Automatic Platen Press. This press will do 5,500 impressions per hour on stock from seven pounds to a No. 12 sheet board, in 10 by 15 inches in size. The ink drum is small so that no surplus ink is carried on the drum, but each impression is made from fresh ink. The runners on the form rollers are V-shaped to prevent skidding. A straight line feed and delivery uses only one member to pick up and deliver which permits the press to be coupled in tandem for the production of multi-color printing *(41)*.

Finch Telelcommunications, Inc. have installed an antenna similar to a giant skyrocket which will broadcast from static-free facsimile equipment. They have two models, the FRS 141 which is a duplex unit which sends (and receives) messages by radio at a speed of 30,000 words per hour or 2,760 square inches of picture copy. The FRS 140A is a medium speed instrument which sends only 9,600 words per hour or 918 square inches of copy. The machines are designed for point-to-point, mobile, and other commercial communications services. It will operate on any communications channel which will handle a subcarrier frequency of 1.3 kilocycles. (300 to 2300 c.p.c.) The units are in duplex and are identical and have push buttons for automatic framing and ejection of messages *(42)*.

Frank H. Smith discusses the process of anodic exidation of aluminum together with the properties of the anodic oxide coating. He mentions that anodized aluminum plates are suitable for lithographic printing, but that they cannot be readily deep-etched *(43)*.

A method of electrically etching zinc printing plates is the subject of U. S. patent 2,394,190 by Albert R. Kreck. It is claimed to be particularly suitable for halftones. The patterned plate is used as an anode and is spaced in relation to the cathode in an aqueous solution and the etching takes place when the current is passed through the solution from the anode to the cathode. The electrolytic bath consists of 125 pounds of sodium sulphate; 3 to 15 pounds of ammonium thiocyanate in water to make 72 gallons *(44)*.

A method of making a metallic screen stencil is developed by the partially filling of a stainless steel screen with tin. A resist is applied to the plate and the part not covered is etched out *(45)*.

The Fairchild Camera and Instrument Company, of Jamaica, N. Y., has completed a machine which makes photoengravings automatically. The plates made are 65-line screen, 8 by 10 inches, on plastic. A positive photographic print is mounted on the right-hand cylinder of the machine. This is scanned by a photoelectric cell. On the other cylinder is a sheet of plastic of suitable properties. A cutting device has a heated stylus with a pyramid-shaped point. This is actuated by a magnetic armature which forces the stylus into the plastic, burning pyracid-shaped depressions into the surface. The scanning system and the cutter head are controlled by simple electronic amplifiers so that the depth of the depressions formed correspond to the light and shade of the photograph *(46)*.

The Intertype Corporation has a thermostatically controlled molding device. The thermoswitch turns fans on to cool the mold when it reaches a temperature of 218°F. and off when under this temperature. 218°F has been found to be the critical temperature. Molds which are made above this temperature tend to be hollow and, when too cold, they give a frosty face. By having the fans on only above 218°F., current is saved and under cooling is avoided *(47)*.

## Rollers

Carl G. Bingham in the *Printing Equipment Engineer* for May, 1946 discusses newspaper press rollers. Natural rubber does not handle oil inks readily and neither does synthetic rubber, but glue glycerine is a natural for them. Rubber rollers are affected by the inks. Therefore, the roller maker should be given some of the ink to test with so that he can determine the best roller to supply. The glycerine rollers are affected by moisture and heat. Bingham predicts a third roller composition which will combine the characteristics of the two types *(48)*.

Frank J. Soday has obtained a series of patents which deal with the manufacture of isoprene resins and compounds. These resins in the proper forms can be used as coatings for wood, paper and textiles as well as for metals. They are light colored, thermoplastic, solid at room temperature, and have good dielectric properties. In another compound, printing rollers, hose, gaskets, and other flexible forms are made *(49, 50)*.

U. S. patent 2,393,097 claims a roller for lithographic, printing, and lacquering machines. It is composed of a mandril covered with a textile cemented to it. A centrally bored block of cork is then cemented to the textile covering and the whole machined to the proper diameter. Such rollers are said to retain their resiliency over long periods of time and are not affected adversely by inks, lacquers, or cleansing compositions *(51)*.

Collyer and Dannenberg, of Godfrey L. Cabot, state that the use of Silcone oils in tires makes them heat, weather, chemical and abrasion resistant to a very high

degree. No report has been made, but it would appear that these oils would produce the ultimate of perfection in press rollers. *(52)*.

Vasel Manufacturing Company are manufacturing an adhesive roller covering called "Stick-E-Bak" which can be applied to a rubber or vulcanized oil roller. The covering is for dampenting rollers and does not require sewing. It does not shrink, stretch, or distort *(53)*.

### Newspapers

The Trenton( N. J.) Times has installed an offset press manufactured by R. Hoe & Company for producing the four-color Sunday supplement. The press uses a 70 inch web, coated paper. The process uses heat-set inks being run at 12,500 to 15,000 impressions per hour. The heat is applied after the second impression and the paper then passes over a cooling device *(54)*.

Orville Dutro & Son have developed a combination press whereby run of paper can be printed by the rotogravure press which may be hooked up in combination with offset units. By use of the rotograf, it is possible to underlay an off-color paper with a white in the areas for color work and thus overcome off-color of the paper *(55)*.

The Craftint Multicolor Process eliminates all Benday tinting, gray and camera color separations. The process uses transparent acetate sheets with invisible line and dot patterns which can be brought up for reproduction by the application of chemicals. The artist uses the chemicals as he would paint. Multicolor boards are furnished in sets of three, each bearing two photographic invisible screens, a twenty-five percent dot pattern, and a 50% line pattern. The screens on the three sheets are respectively angled at 45, 75, and 105°, and are in perfect register *(56)*.

Louis D. Young foresees hardly an American city without multicolor newspapers in the next five years. By the use of one shot, four-color negatives, much of the trouble of color separation is eliminated *(57)*.

Charles F. Geese, however, feels that newspapers by offset require further research *(58)*.

### Offset

The principal developments in the offset process seem to be in the printing plates. The use of the various plates makes necessary the changing of the solutions used in developing and printing of the plate.

The grain of the plate determines the type of work for which it can be used in printing. G. A. H. Elton and G. Macdougall have studied the methods of measuring the roughness of lithographic printing plates. Roughness ratio, surface-void volume, and grain depth are discussed *(59)*.

A method of transferring relief plates to lithograph plates is discussed by A. C. Austin. A relief plate is rubbed up with chalk in the process of manufacture, but this process uses a black powder. The face is then polished to clean the printing face. An impression is then taken on a developed and fixed photo negative which has been held between two dampened lintless blotters until slightly tacky. The film takes up the black powder making a negative. This is denser in body than in photoprint *(60)*.

Toland and Burbank, U. S. patent 2,402,469, make a paper plate by incorporating cold-swollen polyvinyl alcohol into a suspension of fibers and then forming a felted web. The result is plasticized by a heat treatment. Fillers from 30 to 50% may be added. Casein is mixed with the polyvinyl alcohol to eliminate adhesiveness yet allow its bonding effect throughout the fibers *(61)*.

Toland and Bassist, U. S. patent 2,373,357, make a plate by coating with a polyvinyl alcohol layer and a sensitive gelatine emulsion layer. After exposure and development, the image is bleached in bichromate, hardened in both layers and the unaffected gelatine washed off *(62)*.

The use of unsized parchment in the Finno Process for rapid reproduction in offset duplication is very simple. The paper will stand typewriting, using a grease-base ribbon, drawing ink and pen, or brush and ink and a hard pencil, and by letterpress or offset using a special ink. Typewriting will produce up to 3,000 copies while press copies will produce up to 10,000 copies. The plate can take corrections with a soft rubber eraser because the surface is not broken, the plate being single ply. It is also not sensitive to fingerprints and can be folded or creased. A special plate etch and fountain solutions must be used. The plates also stay open for a considerable length of time. They have not found use on the large presses due to their inability to take photographic images and also to too much stretch on the press *(63)*.

Jahoda and Wittenmeyer, U. S. patent 2,393,378, have a plate of thin, wet-strength paper on which they have a coat of ferro-gelatine which becomes hardened in the printing area by contact with a chemical which will react with the ferro salt. The image is then hardened on the surface, leaving the surrounding areas and paper still water absorbent. The moisture then can pass through from the back and keep these areas ink resistant while the hardened area is ink receptive *(64)*.

A Dutch patent, 56,871, by W. A. Boekelman and A. Elfers, is for the treatment of a water-receptive metal such as chrome alloy without graining or gumming. The chrome surface may be defatted by an alkali detergent and treated with an acid, the anion of which stands on the nonswelling side of the lyotropic seris, i.e., F1-$SO_4$-C1-Br-$NO_3$1-CNS (the first ones are the less swelling ones) *(65)*.

P. C. Smethurst has reported on a method of sensitizing gum with ferric salts in an effort to develop a deep-etch plate without the use of a positive printing. Processes being used are based on the indirect method of coating plain gelatin layers on metal, and then soaking them in solutions of ferric salt to sensitize them. Difficulties encountered include unexplained variations in sensitivity of coatings coupled with the need for some storage before their full light sensitivity develops *(66)*.

Considerable interest has been shown in bi-metallic plates. British patent 564,753 is for a stainless steel plate which is roughened, cleaned in a solution of 2% formic acid, 5% alum, and 2% nitric acid, coated with bichromated colloid developed in a 36°Be calcium chloride containing 2.5% ferric chloride, 1% nitric acid, 3% hydrochloric acid, and 2.5% cuprous chloride which deposits a monatomic thickness of copper. The ferric chloride is adjusted to lower the potential between the plate and the bath to prevent too rapid a deposit of copper. Grease is applied which adheres to the copper. The colloid is removed by water. This produces a bi-metallic plate without unusual apparatus *(67)*.

The Alkuprint Relief Printing Plate is produced by coating an aluminum base plate with copper by the galvanizing process. The image is placed on this surface and the nonimage parts etched down to the aluminum *(68)*.

The Aller process uses a stainless steel plate with a thin, electro-deposited coating of copper. The plate is

exposed and the nonprinting areas etched down to the steel *(69)*.

Tests made by R. W. Crabtree & Sons, England, are very satisfactory. The copper deposit can be cleaned off and the plate used repeatedly *(70)*.

Sidney Blau of the Electron Intaglio Corporation has discussed Bi-metal plates in a series of articles in the *National Lithographer*. He points out that without a protective colloid, any bare metal ink-attracting image would have a very limited life, metals being quite reactive to an electrochemical action called hydrolysis. This is the cause of lithographic printing images eventually losing their attracting power even under perfect press conditions. Thus the salts of the fountain acid combine with the greasy image to form hydroxylions that form alkalies. These will, in turn, dissolve or remove the greasiness of the image. This is overcome by the pressman renewing the image ever so often by relacquering. When the nonprinting areas become worn down, the image finally becomes subject to the wear of the roller's abrasion and the image or plate becomes completely degreased or blind.

The Electron Intaglio Process consists of producing an intaglio lithographic plate by developing a plate with an electrically resistant medium and then giving the plate an electrolytic treatment to build up the nonprinting areas. A plate of this kind requires less water during running, producing a better register, faster drying of the ink, sharper, glossier lithographing. The plates are originally zinc or aluminum *(71)*.

F. H. Hausleiter in Germany has developed a bimetallic litho plate in which the base is polished brass. The plate is scoured with pumice, coated with a bichromated gum and treated to produce a resist similar to dragon's blood or asphaltum on the inked areas. The nonprinting areas are then electroplated with stainless steel (chrome-nickel) to a depth of 0.001 inch. The light hardened resist is removed and the ink areas are smooth brass, lying a few ten-thousandths of an inch below the nonprinting area which is covered with a smooth surface, stainless steel. If scum appears, the plate is scrubbed with pumice and water, then re-etched. The plate may be stored and reused at any time. There is no danger of oxidation with the resulting loss of printing *(72)*.

A further development is the tri-metal offset plate of the International Printing Ink. Their base plate is zinc on which a copper plate is electrodeposited, and then a layer of chromium is deposited over the copper. The plate is exposed, using positive film, and the printing area is etched away to the copper. Copper is ink receptive and the chromium is water receptive. These plates give long runs and it is reported that the plate shows no signs of wear even after 600,000 impressions. The original base plate tried was stainless steel, but due to the unavailability of steel for this purpose, zinc is the standard base at present *(73)*.

Walter A. Kaiser has discussed the Optak process in the January, 1946 issue of the *National Lithographer*. The article gives a columnar comparision of Optak against the older method of Collotype printing *(74)*.

The Cronak Process is a treatment for zinc which gives them longer life and better printing surface. The process produces an inert surface on zinc which prevents chemical reaction. A Cronaked albumin plate develops easier than the uncoated plate in the hottest weather and yet the image is firmer; desensitizing agents adhere better to the plate; scum and image thickening are rare; and there is no image sharpening. The Cronak Process is patented but licensed by the New Jersey Zinc Sales Company. The original process used considerable bichromate and produced a dark colored plate. This has been modified by the Lithographic Technical Foundation using one-tenth the amount of michromate and producing a lighter color *(75)*.

P. C. Smethhurst has described the Cronak Process as a chemical reaction which depends fundamentally on the exhaustion of the acid at the surface of the zinc as the latter is attacked. He points out that it is possible to produce on the zinc an absorbed layer of chromic hydroxide without any $CrO_3$ content by using a chrome alum solution instead of the dichromate, and acidifying it with sulfuric acid. Smethhurst mentions other anti-scumming processes *(76)*.

Charles H. Van Dusen has obtained patent 2,393,875 for an etching and dampening solution for use on planographic printing plates. The solution includes formaldeyhde which it is claimed obviates the tackiness of the rubber blankets *(77)*.

The sodium salt of carboxy-methylcellulose produced by Dow Chemical Company as Carboxymethocel S and Hercules Powder Company as "CMC", and called in the lithographic trade cellulose gum, has proven to be a good substitute for gum arabic. When litho plates are properly etched, gummed up, and run on the press with cellulose gum in all steps of the process, it has the following advantages:

1. It is effective in keeping halftone shadows and fine reverse lettering open, without the use of excessive amount of acid in the fountain solution.
2. Since less acid is required in the fountain solution, there is less tendency to sharpen and fail.
3. It keeps all types of forms running with a very small amount of water on the plate.
4. Since there is less water, there is less emulsification of ink, hence quicker drying of the ink.
5. If the plate catches it quickly cleans with water.
6. It reduces blanket scum.
7. It prevents counter etch of the first color on the second plate.
8. Plates rolled up in platemaking look cleaner than with gum arabic.
9. Danger of gum streaks are minimized and it does not adhere to the working area.
10. It is easy to make. (Hot water and rapid stirring for two hours).
11. Does not require filtering.
12. Does not sour. It may mold on long standing.
13. Does not become stringy.
14. It is cheaper per gallon as 6 to 8 ounces per gallon equals 28% solution of gum arabic.
15. It is not imported.
16. It is compatible with gum arabic *(78)*.

Polyvinyl alcohol has been tried as a substitute for albumen in sensitizing lithographic plates. It is manufactured by duPont as Elvanol 71 A-24 and 52 A-22: 11.5% in water with 1.0% ammonium bichromate has been used. It is claimed that difficulty has been experienced in getting printing ink to adhere to the polyvinyl coating *(79)*.

A German process is said to produce a synthetic egg white from codfish or steam dried shrimp. It is made by extracting soluble proteins with dilute acetic acid and the fats with trichloroethylene. The extracted tissue is then stirred in warm dilute sodium hydroxide and the partly hydrolized protein is neutralized with acetic acid and spray-dried into a white powder. This material apparently has not been tried in lithography but might find a use there *(80)*.

Charles F. Geese discusses dry lithography. He states that it is being used successfully in producing

bank check tints, type labels, and certain government tax stamps. The objection to dry lithography seems to be due to the extremely close tolerance required. Blankets cannot vary more than 0.001 of an inch and the same applies to the printing cylinders and ink rollers. The plate must be very accurate in thickness and of copper that will not stretch under pressure. A successful method for dry lithography will make long runs possible and will give higher fidelity halftone dots in screen printing *(81)*.

### Photographic

Richard Thomas, of Thomascolor, Incorporated, Los Angeles, has developed a device which is said to take a four-color picture on a single piece of ordinary panchromatic film, and to produce automatically "perfectly balanced identical simultaneous image exposures" without the use of dyes or tints. The film can be developed immediately with no need of special laboratory equipment and processing of final prints is as fast as for regular black and white prints. Since all three are primary colors and are on a single sheet of film, the problem of shrinkage is eliminated *(82)*.

A French Patent 881,779 (May 5, 1942) describes the use of polyurethane as a binder for light-sensitive substances. All of the light-sensitive substances may be employed and they may be added by any of the known methods *(83)*.

Eastman Kodak have developed a color film called Ektachrome which can be developed by the user. John T. Groet, in the *Photoengraver's Bulletin*, suggests methods for making Ektachrome transparencies and four methods for making separations from transparencies. Indirect negatives from a photographically masked transparency is the preferred method. Two types of masks are used in making plates from Ektachrome. Masks which reduce the brightness range of the transparency to bring it within the practical limits of the printing process, and also effect a degree of color correction, are used; and an additional "highlight" mask may be used in cases of transparencies in which highlight detail and gradations play an important part *(84)*.

Ektachrome has a lower contracts than obtained with Kodachrome and thereby the rendering of highlight and shadow detail is improved. It permits a range of lighting approximately that used in black-and-white work *(85)*.

Another development of Eastman Kodak is a photographic stripping film, U. S. patent 2,391,171. A wax layer is laid on a base paper such as photographic paper and calendered to smooth surface. A film forming material such as cellulose ester is applied. Then the photographic emulsion *(86)*. Eastman Kodak have also introduced lumenized lenses which are coated with magnesium fluoride and are said to increase the screen brightness equal to an increase of one-third to one-half the projector lamp wattage. Coated lenses improve the contrast, definition, and color purity of the projected image. The Eastman Kodak Company "Lumenizing" technique is said to produce a coating which is as hard as that of average optical glass *(87)*.

The Polaroid Corporation has developed a method for molding lenses and other optical elements from transparent plastics. The process allows non-spherical surfaces to be formed with ease, and eliminates for all elements the lengthy cutting and polishing necessary with glass. The method used gives more precise surface than has hitherto been possible by molding. In achromatic combinations, polycyclohexyl methacrylate replaces crown glass, and polystyrene replaces flint glass *(88)*.

The American Optical Company have developed a new type of glass in which beryllium fluoride has been substituted for silicon dioxide. This glass permits light to pass through at a higher speed than any other known glass. Light velocity through beryllium fluoride glass is 146,000 miles a second as compared with 122,000 miles a second in optical glass for spectacles. The new glass is said to cause less bending in a beam of light and produces less color-scattering effect. The objections to the glass is that it is hygroscopic *(89)*. This company also worked on controlling the amount of light reflected from glass, used during the war to improve military optical instruments and radar equipment. Their methods can be used to increase reflection as well as reduce it. The new treatment can be applied to control light reflection from glass, plastics, paper, and photographic prints. The techniques employ new chemicals and the coatings are either dripped, spun, sprayed or swabbed on glass, etc., of unlimited size. To increase the amount of reflection from glass, its surface is covered with a single layer of high-reflecting coating, or multiple alternating layers of low-reflecting and high-reflecting coatings. Pastel shades of different colors can be produced by the techniques. Many uses for this technique are mentioned such as one-way glass in structural and decorative mirrors. A gain of over 60% in light transmission is claimed *(90)*.

M. N. Friend has described the modern improvements resulting from coating lenses. The kinds of coatings in common use, the method for applying the coatings and some notes on the durability of them are included. A special note is made of the improvement in definition and contrast because light scattering is reduced *(91)*.

A Duplex Screen for drop-out and combination negatives has been reported. The screen is a conventional screen ruled 50-50 with magenta dye. The dyed line does not refract the light as is done by the conventional black line. The result is a sharp clean dot with no fringe or halation and of precise size. Two Wratten filters are used; a No. 4 Yellow and a No. 30 Rose, and a straight unfiltered white light. The yellow filter causes the magenta lines to appear black and the rose filter give the effect of no screen. The operator can shoot a combination line half-tone negative on one piece of film in perfect register without removing either the film or the screen from the camera and in one operation. Highlight or drop out negatives can also be shot *(92)*.

The Ozachrome process uses the Ozalid process in color work. The normal method of color proving calls for proofs of the first two colors which are used for correction. By using the Ozachrome Process, prints are made of each color and used as progressive proofs. Exact duplicates of the original are produced on the Ozalid. These prints are dry and ready to use immediately after they are made. This speeds up the work of correction *(93)*.

A new method called "Reduko" is for reducing the color correction of Kodachrome and other color transparencies. Reduction is accomplished by immersing in the solution until the desired color is obtained and then washing thoroughly in water. Spot reduction can also be done with the solution *(94)*.

The Land Process is a one step procedure for prints. The film and paper are exposed together in the camera. At intervals between the film and paper, equal to one exposure, are pods or tubes containing a solution of developer-fixing which is crushed when the film passes between two rollers. There is just sufficient of the chemicals to develop and fix the film and printing and although the print is damp when removed, it is not wet. The developer-fixer consists of hydrochinone, hypo,

sodium hydroxide, sodium sulphite, water, and sodium carboxymethyl-cellulose *(95)*.

The Perfex Corporation, of Milwaukee, Wisconsin, have developed a new low cost method of reproducing kodachrome, color transparencies, painting, or other color material. The method is said to be lower in price than the conventional color engraving *(96)*.

Philip A. Hunt Company have a new buffered, non-liquid acid hardener for photography which is said to have 50% longer life and the ability to dissolve more silver with greater savings *(97)*.

This company has also introduced a new developer which aids in reproducing sharp and fine lines, clear blacks and whites and clean halftone dots. The developer contains several new chemicals recently made available which are said to prolong the life of the developer *(98)*.

Unidel is an automatic film developer which does the whole operation of developing, fixing and hardening the film with no possibility of over-development. It is stated that development is automatic in that the film develops to the proper contrast and then begins to fix. The developer comes in a dry form ready to dissolve *(99)*.

The Timber Engineering Company, of Washington, D. C., report the use of lignin treated with alkali for the recovery of silver from hypo baths. An amount of lignin equal to the amount of silver to be saved is added to the bath and when heated the silver drops to the bottom and the solution can be poured off *(100)*.

The Naval Research Laboratories have designed a lightweight electronic photoflash which will operate at three-second intervals firing 4,000 flashes without changing batteries. The standard model weights 11½ pounds, will fire 10,000 flashes with a single bulb using less electricity than an average light bulb, burning steady all day. The exposure time is 1/10,000ths second producing a light equal to the medium sized flash bulb. The light is triggered either with a manual button or synchronized for electrical triggering *(101)*.

The U. S. Naval Ordinance Testing Stations, Pasadena, California, have an all electric camera shutter which gives an effective exposure of four hundred-millionths of a second. The heart of the shutter is a Kerr cell which has no moving parts. The cell permits polarized light to pass through it only when it is supplied with an electric field. The ordinary Kerr cell is composed of two flat plates or electrodes immersed in a fluid (in this case nitrobenzene) which becomes "birefringent" upon the application of an electric field. -When this cell is placed between polarizers crossed for minimum transmission of light, the arrangement becomes an optical shutter. When a voltage is applied to the electrodes, the state of polarization is changed and permits light to pass through the second polarizer *(102)*.

William C. Huebner had invented a process lens which is capable of laterally reversing negative images on plates and films without the necessity of turning the camera at right angles to the copyboard *(103)*.

The Navy has also sponsored trivision or three-dimensional pictures. These are accomplished by using a very large lens which has the effect of looking around corners. The film has on the side toward the lens an embossed formation of tiny horizontal ridges, about 300 to the inch. These act as tiny lenses producing a stereoscopic effect. The coating of the film is on the opposite side, and has normal contrast but a long scale of gradation. A special photoengraving process has been developed to reproduce the depth of perception. In printing, regular prints are made but an additional operation is added which is in the nature of a die cylinder which completes the three-dimensional effect. Any kind of paper may be used *(104, 105, 106, 107)*.

There are several typewriters which have been built to produce type on lithographic plates. The visible line typewriter sets a whole line of type before printing. The machine works like a standard electric typewriter in other respects. The Electromatic, all electric, of the International Business Machine Company, gives uniform pressure in typing and with a carbon paper ribbon produces uniform color. With a split spaced bar, the operator may, when necessary, set spacing for one, two or three units. In this way a justified right hand margin may be achieved. The Royal Photo Offset uses a carbon ribbon and by a halfback spacer the operator can justify lines. The Underwood Automatic has a right hand justifying device and automatic stroke control. The Edison Margin Justifier may be installed on standard typewriters. The Coxhead Varityper is equipped with a wide range of type faces *(108)*.

Photo Composing Machines are finally in operation. In the United States the Intertype Fotosetter and the Phototextype are the nearest perfected. In Europe the Orotype, the Uhertype, and the Westover Photo-Typograph. The Fotosetter has been in use at the Government Printing Office, and finished work produced by this machine and printed by offset has been displayed. Matrices are assembled in a manner similar to the Intertype slug-casting machine and the assembled line delivered to the camera. The camera then projects the line character by character onto the sensitized paper or film. The line is automatically justified and the matrices returned to the magazine. Different size type can be projected from the same matrices so that only two sizes of matrices are necessary to produce all the regular sizes from 4 to 36 points *(109)*.

Dr. R. M. Schaffert, Supervisor, Graphic Arts Research Division at Battelle Memorial Institute, described to the PIA Convention an electro process of platemaking in which a metal plate with a special coating is placed in the camera in place of the film. The coating is sensitized by spraying it with electrons. The plate is exposed similar to film with comparable photographic speeds. The plate is developed by dusting with a special micronized powder which makes the image visible on the plate. The plate is then heated until the powder fuses to form a solid resist. The plate is etched or, if the plate were originally grained, the plate can be used immediately as a lithographic plate *(110)*.

William C. Huebner, U. S. patent re 22,869, April 15, 1946, is for the Electronic Printing Press which prints by an induced field of electric force, without any printing pressure *(111)*.

The General Electric Company have an electronic register control which is used to maintain register on rotogravure five-color presses at the speed of 1,000 feet per minute to an accuracy of a few thousandths of an inch. It is necessary to check each cylinder after the first to see if it is in the correct position to lay its impression exactly upon the previous printed one. Register must be within 0.005 inch so that the system responds to signals as short in duration as one-hundred-thousandths of a second. Formerly, about one in every 25 impressions was in register; now only one in 25 is out of register *(112)*.

A new reproduction process which employs entirely chemical means is described by which any drawing or painting can be reproduced without harming the original. The original is subjected to ammonia vapor until charged with the vapor. A glass slab such as a portable "Opalograph Stone" is treated with an acid such as dilute nitric and the alkali-vapor-treated original is laid

upon it under pressure. The alkali vapor causes the stone to become selectively repellent of a glycerine solution in position and degree precisely according to the vapor content of the drawing medium which, in turn, is claimed to vary directly as the tones of the drawing. After the glycerine treatment, the stone is inked and proved in the lithographic manner *(113)*.

Eastman Kodak have developed a new scribing plate for use with optical comparators of the contour project on type which is glass-coated with a green-dyed gelatin which is transparent. The new plate eliminates the need for using hydrofluoric acid to etch glass plates *(114)*.

Remington Rand have announced a new plastic plate which uses two patented plastics. It is a direct image plate on which corrections can be made which are not noticeable and which stand up during the length of the run. The plate has no pronounced curl and has high tensile strength which eliminates stretching and pull-outs. Work run from this plate is said to equal that from aluminum plates *(115)*.

A thermosetting polyvinyl composition mixed with aluminum stearate as a curing agent reacts when the mixture is subjected to temperatures between 275 to 310°F. for 30 to 40 minutes. It is said to be useful for inks *(116)*.

The use of Methocel in a light coating on paper gives better results in brightness and gloss with inks and varnishes. In waxing, a prime coat reduces penetration of paraffin and maintains the opacity and whiteness of the original stocks *(117)*.

Phlobaphene, a waxlike material in the bark of pine trees, appears to have promise of becoming important in plastics. It may replace plasticizers from castor oil, alkyd products, and phthalic acid derivatives *(118)*.

### Adhesives

Bostik No. 4500 is used for mounting printing plates without nails. Cement is poured and leveled on the plate and the block. Allowed to dry. The plate is then heated to about 350°F. The hot plate is then pressed onto the block and held under pressure for about 10 seconds *(119)*.

Paisley Products, Incorporated, have a new product Cooler-Proof Glue which is used on labels for glass which are packed under wet storage, high humidity and water immersion *(120)*.

An extremely strong plastic glue which sticks at temperatures from 60° below zero Fahrenheit up to 300° above zero has been announced by Westinghouse Research Laboratories. The glue is a resorcinol resin and a glued joint, 1 inch wide and 3 feet long, will hold up a 50-ton weight *(121)*.

An adhesive made from yeast grown on waste sulphite liquor by heating it to between 160 to 220°F is covered by U. S. patent 2,388,910. The sugar in the liquor feeds the yeast. The lignin present adds to the adhesive value *(122)*.

National Starch Products have a noncurling remoistening gum for use on lightweight air-mail envelopes. It is light in color has high gloss, clean machining characteristics, and a responsive tack when remoistened. Its hygroscopicity is very low for a noncurling gum so that blocking is minimized *(123)*.

Paisley Products, Incorporated, have a thermoplastic resin emulsion adhesive which is good for foil lamination. It works best on roll applicator machines for foil to acetate, cellophane, glassine, bond, kraft, and other materials *(124)*.

A patented process called Paramount Sewing is done by side-sewing narrow adhesive tapes with gum side out on each side of the back of every signature. The signatures are jogged and moistened and then pressed in a vise to insure full adhesion. The book is then trimmed and rounded as usual *(125)*.

### Humidity

Humidity is an ever important factor in paper and printing. With the new ideas in electronics, a number of new instruments have been developed for detecting and measuring humidity.

Muslin impregnated with a calcium chloride absorbs moisture from the atmosphere. Its electrical resistance is reduced. The change in resistance is measured by an indicator which is calibrated to read directly in terms of humidity *(126)*.

The C. J. Patterson Company of Kansas City, Mo., and the Colloid Equipment Company have both announced electronic moisture detectors. The former is said to be automatic and requires no calibration curves. It will give results in 15 to 30 seconds. The other instrument is the Delmhorst Moisture Detector. It covers a range of moisture from 7 to 25% with accuracy of plus or minus 1% *(127, 128)*.

The American Instrument Company have a humidity sensing element or electric hygrometer for measurement or control which occupies only 2 cubic inches and can be connected with several means of indication or control *(129)*.

The Harry W. Dietert Company of Detroit, Michigan, have the Dietert Moisture Teller which is classed as flash drying for moisture analysis *(130)*.

The Aquastop M-V-Bar envelopes are a means of controlling moisture content in a skid of paper. One part of the wrap is placed on the skid and the preconditioned paper is piled as usual. An envelope of moistureproof wrapping is placed over the skid of paper and sealed to the moistureproof part in the skid. The envelope is a chemically treated, moistureproof fabric which holds the paper at a constant level, regardless of the humidity of the pressroom *(131)*.

### Infrared

A Dutch Patent 58,048 has been granted for drying prints by infrared rays of a wave length under 14,000 A. The rays are absorbed more by the dark area of the print than the clear background and so the print warms before the rest of the paper *(132)*.

The Fostoria Pressed Steel Corporation recommends infrared lamps in a bank over the delivery to dry ink. It replaces spraying and reduces offset and can be used on regular offset inks *(133)*.

*Operating Brief*, the National Research Bulletin, says that drying with infrared causes less curling when used to dry the gum on envelopes. The ray causes less moisture being sealed in the paper due to drying from the inside out, eliminates blocking as well as fumes from the working area, and instantaneous heat is always at hand *(134)*.

Rondon Industries have the Mercury Infra-Red drier for use on engraved work. It does not require attention from the operator and does not dry or curl the stock *(135)*.

Dr. Gorton R. Fonda of General Electric Company has discovered that a tiny bit of lead added to zinc sulphide makes infrared rays visible *(136)*.

Polaroid Corporation has been assigned a U. S. patent 2,418,605 for a new filter for infrared rays. The filter is composed of a sheet of dyed regenerated cellulose laminated between glass. The filter is opaque to normal light, but transparent to infrared *(137)*.

## Testing Instruments

A new C-46 Inkometer measures tack of ink while in motion *(138)*.

I. M. Bernstein has designed a new type applicator for the ink fineness gauge for determining the fineness of grind *(139)*. Rolling friction is used instead of sliding friction.

Strachan and Henshaw, Ltd., Bristol, England, have an Ink and Paper Testing Machine which consists of a small printing press. An ink duct controls the amount of ink used. The inking system consists of two metal and one composition rubber roller. The impression cylinder is covered with a rubber blanket. The press can print by direct pressure or by offset. It is stated that the press will show light reflectivity or degree of whiteness, color distribution, penetration of color under printing pressure, absorption of color during drying, and finish when dry. It prints an 8 by 9 inch sheet *(140)*.

This company also handles a Printing Pressure Micrometer which measures the actual thickness of the paper and the thickness under pressure *(141)*.

The Davis Emergency Equipment Company of Newark, N. J. have an instrument which measures static and is called the "Statometer" *(142)*.

B. F. Goodrich have an apparatus for testing porosity in which direct readings are taken. A constant speed fan evacuates the air from the test chamber and the degree of vacuum is read directly *(143)*.

A. T. Gardner reports that the properties of paper which can be determined on the proof press are the ease of impression or coverage, ink absorption and relative strike-through and show-through *(144)*.

Voet and Brand have studied the speed of penetration of printing ink into paper *(145)*.

V. G. W. Harrison—PATRA has made an extensive study of the objective and subjective factors in the sensation of gloss *(146)*.

V. V. Vallandigham has applied the photoelectric cell to measure the rate of oil absorption of paper surfaces *(147)*.

Dr. Melvin Mooney of U. S. Rubber Company has obtained patent, U. S. 2,417,988, on an instrument for measuring roughness of rubber, in which air is forced through an opening in the middle of a plate which is applied to the surface to be measured. A pressure gage is used to determine the amount of air flow and can be integrated to measure the roughness *(148)*.

Taber Instrument Corporation has announced a new stiffness gage. It is actuated by a motor *(149)*.

## Research

The National Printing Ink Research Institute has been established at Lehigh University. Their scope is: (1) fundamental research on new types of printing inks: (2) study of chemical and physical properties and changes in printing inks; (3) relations of ink to printing surfaces; (4) investigation of new materials for use in printing inks; (5) establishment of specifications and testing of new materials; (6) development of instruments and equipment for testing inks; (7) investigation and developments of equipment for the manufacture of inks; (8) cooperation with machinery and equipment manufacturers in the development of new processes for reproduction; (9) correlation of research with that of other organizations in the graphic arts; (10) establishments of a library of all literature pertaining to ink and other branches of the graphic arts *(150)*.

The Research Association, PATRA, are studying printing. Evaluated for quality, printing calls for study of the factors influencing the appearance of the finished job; such as sharpness, solidity, cleanness of impression, color contrast between paper and ink. Optical and mechanical qualities of paper are to be examined, compared and measured, as will drying of ink by absorption and oxidation, ink-fading, print-through, set-off, and the behavior of inks during printing. Conditions operating on the printing press are to be studied; evaluation of pressure and speed of ink film thickness, and of the operations of distributing rollers. Reduce makeready time and less wear on plates *(151)*.

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# Test Apparatus and Procedure for Determining Resistance of Structural Insulating Board To Impact and Concentrated Loads*

By Frank B. Rowley[1] and Millard H. LaJoy[2]

## Abstract

*A research program concerning essential properties of insulating board, together with methods and types of test apparatus for rating these properties, is being conducted in the Engineering Experiment Station, University of Minnesota, in cooperation with the Minnesota and Ontario Paper Company. The results of this study concerning two of the properties, impact strength and concentrated load strength, are discussed in this paper.*

*Impact strength may be defined as the resistance of insulating board to shock or impact loads on those areas where there is no rigid backing under the area of impact.*

*Several methods now in use for determining the impact strength of other types of materials are discussed in the paper, but as pointed out, none of these were designed for material such as structural insulating board. The method recommended consists of firmly supporting the sample around its edges in a horizontal position, dropping a given weight having a definite shape of contact point through a specified distance, and noting the number of drops necessary to produce failure in the material.*

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*Among the variables considered in developing the method and test apparatus were, first, the shape and area of the indenter; second, the weight of hammer and distance through which it should be dropped; third, the apparatus; and fourth, the various methods of rating the size of sample and method of supporting it in the test results. Experimental data are given concerning the various parts of the investigation and also the rating of several different types of structural insulating board and sheathing by this method. The design of the machine, the method of supporting the specimen, and the test procedure are given in the paper in detail.*

*Concentrated load strength may be defined as the resistance to pressure on a small surface area under which there is no rigid backing.*

*The difference between the impact load and the concentrated load tests is primarily in the method by which the load is applied, even though the properties of the materials under these two tests are different. The variables considered were first, the size of test specimen and method of supporting it, together with the relation of the test point to the position of support; second, the size and shape of indenter; and third, the rate at which the load is applied.*

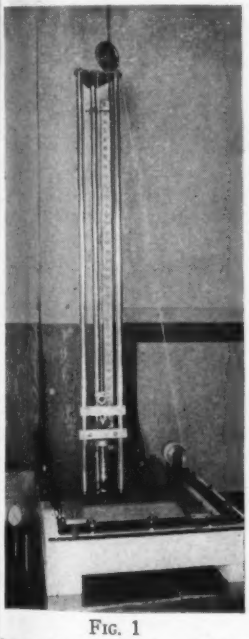

FIG. 1
**Impact Strength Testing Machine**

*Investigation showed that the method of supporting the test specimen and the size of the specimen were not as important for the concentrated load tests as for the impact strength test. The same method of support was used as that developed for the former test. Likewise, the same hemispherical indenter was used.*

*The details of a suggested apparatus together with test procedure for concentrated load are given in the paper, and also the relative ratings of several different structural insulating and sheathing boards are shown.*

*The authors wish to make it clear that both the design of a test apparatus and the test procedures are the result of a laboratory research investigation, and that they are open-minded for suggestions, changes or improvements which may be developed by the use of these test procedures in the field.*

One of the projects in the cooperative research program undertaken jointly by the University of Minnesota Engineering Experiment Station and the Minnesota and Ontario Paper Company is an investigation of the most pertinent properties of insulating board and the selection and devising of test methods suitable for the rating of these properties. Two of the properties investigated are the resistance of the board to impact and to concentrated loads. This report summarizes the results of those investigations and includes recommendations for specific test apparatus and methods of procedure for rating the properties. These recommendations are based on the laboratory investigations made, and the authors wish to state that they have an open mind as to suggestions for modification or improvement which may arise out of the use of these procedures and

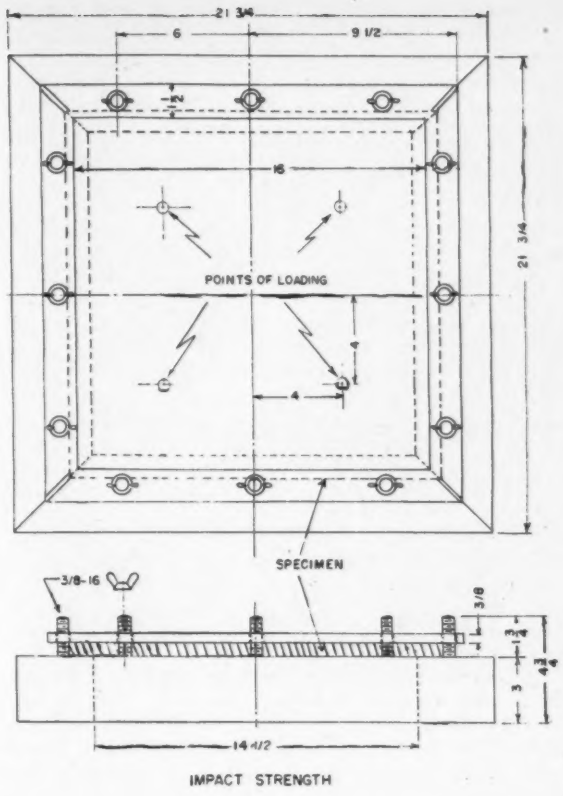


FIG. 2
**Frame Construction for 18 by 18 in. Specimen**

test equipment. The investigation has taken into consideration the properties of the material to be rated, test methods and equipment that are used for rating similar properties of other types of materials, the variations which may be expected in insulating boards, and the variables encountered in the different methods of operating the test apparatus as recommended.

## Impact Strength

Impact strength, as considered in this investigation, may be defined as the resistance of insulating board to shock or impact loads on those areas where there is no rigid backing under the area of impact. Such conditions may be present where insulating board alone is used as a finishing material or during the construction period where insulating laths are used as a plaster base. The accidental movement of sharp objects, such as the corners of furniture or other household items, against the interior walls or the accidental dropping of a ladder or other implement against an exterior wall are examples of this type of loading. The impact strength test measures a definite property of the material and should not be confused with the impact hardness test. During the impact strength test the board is flexed or broken between supports, while the impact hardness test requires that the board be supported under the impact and it is the surface or structure of the board that is tested.

### Other Methods and Apparatus in Use

Various methods in use for testing the impact strength of certain materials have been investigated with the thought that some one method might be applicable to the testing of insulating boards. Common types of im-

pact strength machines found in many metals testing laboratories are those employing a pendulum mechanism, such as in the Izod and the Charpy machines. These same methods are also used in the testing of plastics.

Both the Charpy and the Izod methods measure the energy absorbed in breaking a test specimen by a single blow of a hammer mounted as a pendulum. The difference between these two tests lies in the method of mounting the specimen. In the Charpy methods the sample is held horizontally and supported at both ends, but not clamped. The sample may or may not be notched. In the Izod method the sample is held vertically and is broken by a blow delivered at a fixed distance above the jaws of the vise which clamps the specimen. To prevent any significant shearing effect and to produce a standard degree of stress concentration, a V-shape notch of standardized width and depth is cut in the sample so that it will always break at the notch rather than at the jaws of the vise. Results are recorded as foot-pounds per inch of notch.

The Bell Laboratories' falling-ball test for the fatigue endurance limit of plastics consists of dropping a steel ball bearing from a fixed height to strike an Izod type of test specimen at a fixed distance from the jaws which hold it. This process is repeated until the bar breaks. Using balls of the same weight, a number of samples are broken in order to obtain a reliable average for the number of blows required to cause failure. Then, using a lighter ball, another group of test bars is broken. The number of blows is again averaged. This process is continued until a ball is found which will not cause failure even after a large number of blows. The impact energy in foot-pounds per inch of notch is then plotted against the corresponding number of blows required to cause failure.

In another impact strength test employed in some plastics laboratories, a 12-inch by 12-inch specimen is laid on a metal frame which supports it along all edges. A steel ball is held by an electro-magnet directly above the sample. The ball is dropped from successively greater heights until the sample is broken. Impact strength is reported as the foot-pounds required to break the specimen.

At the Forest Products Laboratory where a procedure for measuring the impact strength of wood specimens has been developed, a hammer of given weight is dropped upon the sample from successively increased heights until failure occurs. Results are recorded as the maximum or the last height of drop of the hammer which breaks the sample.

A procedure was developed at the National Bureau of Standards for determining the impact resistance of built-up wall sections containing insulating board and/or other structural materials. The impact load is applied to the center of the wall, which is supported at the top and bottom edges only, by dropping a 60-pound sandbag of 9-inch diameter from successive heights of drop by 6-inch increments up to failure, or a maximum of 10 feet. The instantaneous deflection and permanent set of the wall section are recorded along with the height of drop.

In the above summary of previous investigations of test methods in use, two different systems of reporting impact strength were used, namely, in energy units, such as foot-pounds per inch of notch, as in the Charpy, the Izod, and the fallingball tests, and the maximum height of drop required to cause failure, as used by the Forest Products Laboratory for tests of wood specimens and the National Bureau of Standards for tests on built-up wall sections.

No standard specifications were found for a test of the impact strength of insulating board. Those in existence for other materials could not be used for insulating boards unless modified to provide a satisfactory degree of sensitivity since insulating boards are not in the same strength classifications with metals, plastics, or wood.

The principal part of all impact testing apparatus is the weight-dropping mechanism. The method of recording the results, however, must depend upon the type of material tested. Obviously, a hard, brittle material like cast iron or glass would not lend itself to the same method of recording results as would flexible insulating board. In the first case, the greater part of the energy of a falling weight is used up in the fracture of the specimen. In the second case, a large amount of the energy may be absorbed within the material itself and may not be effective in any fracture of the material. Likewise, the type of fracture expected in the two materials is entirely different. This was all taken into consideration in selecting the test method to be used. The principal features of the weight-dropping mechanism, as described in this paper, had previously been developed for the impact hardness determination. It appeared to be suitable with reasonable adaptations for the impact strength test under consideration.

## Apparatus Adopted

Figure 1 shows the impact strength testing machine as set up for the impact strength test. The apparatus is rigidly suspended 7 inches above a laboratory bench by two ¼-inch horizontal angle irons. These, in turn, are braced by lengths of flat iron as shown.

The steel base plate, to which the horizontal angle iron supports are attached, is ½ inch by 6 inches by 16 inches. On this base plate are mounted three 44-inch vertical guide rods made from ¾-inch round steel arranged in a triangular position. The top ends of the vertical rods are securely fastened in a ⅜-inch triangular steel plate. A 1⅛-inch diameter hole is drilled in the base plate through which the indenter passes to strike the specimen under test. Two of the guide rods form ways for directing the indenter carriage in a vertical movement.

The indenter unit and hammer head are fastened to the carriage by means of a ⅜-inch stud bolt. This assembly comprises the total weight unit that finally strikes the test specimen. The hammer head and indenter are both removable so that the total weight and/or the indenter size and shape may be varied by changing either or both units. The indenter itself consists of a hardened steel ball bearing brazed to a 1-inch diameter steel rod, thus forming a hemispherical contact unit.

The mechanism for raising the weight within the 36-inch limit of the apparatus is a simple drum and pulley assembly. A cord attached to the upper carriage passes over a top pulley and is wound around the drum attached to the base plate. Heights of drop are set by the adjustable stop on the rear vertical supporting rod after first adjusting the vertical scale so that the gradations

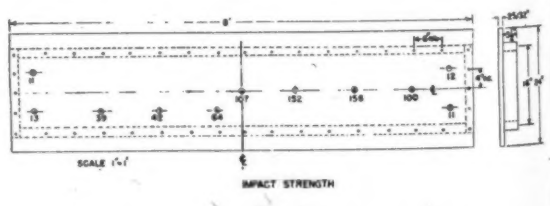


FIG. 3
**Large Wall Section of Sheathing Number of Repeated Impacts to Cause Failure at Various Points. 3 lb., ⅛" Indenter. 6"**

on it record the exact distance from the test specimen. This vertical scale is adjusted by sliding between two friction clamps attached to the back vertical guide rod. The impact load is automatically released when a trip lever attached to the indenter carriage contacts the adjustable stop.

A special frame, or specimen holder, in position for test under the impact machine is shown in detail in Fig. 2. This frame takes a specimen 18 inches square. It is constructed so that the free opening is 14½ inches square which approximates the distance between studs in the conventional wall. Twelve threaded studs extend above the wood base as shown. The test specimen is placed on the lower framework and an open metal frame drilled to pass over the studs engages the outer edges of the test specimen. Wing nuts are used to clamp the specimen securely between the wood base and the metal frame.

Two ½-inch by 2-inch steel bars having a ½-inch bolt threaded into either end are placed over the specimen frame when it is in position under the impact machine. When the bolts are screwed down, the frame is held securely between the laboratory bench and the base of the testing machine.

When permanent set measurements are to be made, a dial gage mounted on a tripod base is used. This is shown at the left of the impact machine in Fig. 1.

## Variables in Test Method

In adapting the test apparatus to any procedure there are several variables which must be considered. Among these are: (a) the type of indenter, its weight, and height of drop; and (b) the method of supporting the specimen and the relation of the test point on the specimen to the edge supports.

*Type of Indenter, Its Weight and Height of Drop.* The height of drop and type of indenter selected are interrelated with respect to their effect on the final results and become important factors in the test procedure. For example, if the height of drop or the weight of the indenter were too great or the size of the indenter too small, then all boards might fracture within one or two impacts and the test would fail to show the differences in impact strength which actually do exist. It is therefore desirable to select a height of drop and type of indenter which will allow a sufficient number of repetitions prior to failure so that differences in impact strength will be shown. Many combinations of indenter size, weight, and height of drop will have the necessary sensitivity to show these differences in impact strength between boards, and the selection of combinations within certain limits is purely arbitrary.

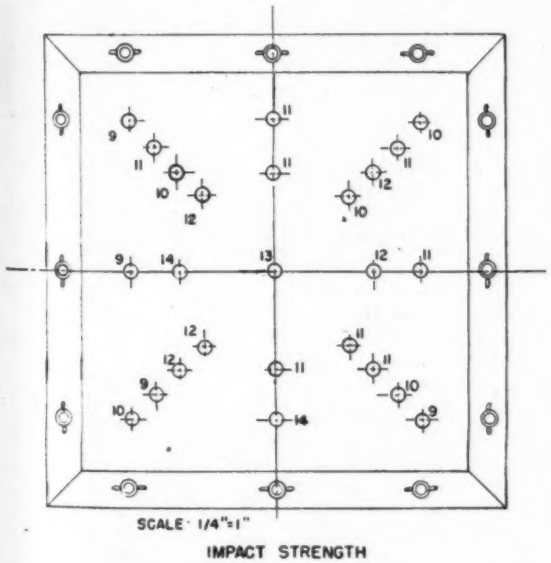


Fig. 4
Variation in Strength Due to Location of Point of Impact Showing Number of Repeated Blows Required to Cause Failure. 3-lb., ¾-in. Ball Indenter—6 in. Height of Drop on Sheathing Board No. S-5

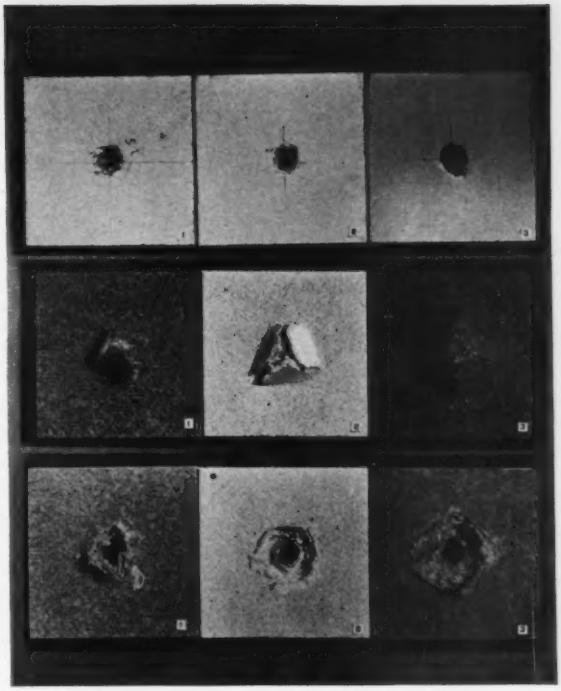

Fig. 10
Effect of Impact at Failure on Three ½-in. Boards

Typical results showing the number of impacts required to cause failure with three types of indenters and three different heights of drop are shown in Table I. In these tests the weight of indenter, type of material, and method of test were constant.

After testing a group of different 25/32-inch sheathing boards using the various indenters and different heights of drop, the ½-inch ball indenter and a 6-inch height of drop were selected for the rating of these boards. This was, however, purely arbitrary and a different size ball might also have been selected. Likewise, a different height of drop might be necessary for the rating of boards which are more rigid and of greater strength than those used in this series. In general, the height of drop will necessitate adjustment in order to get comparative results within a reasonable test period time for the boards under consideration. Obviously, if the very weakest and thinnest boards are to be compared with the stronger and thicker boards, it will be necessary to select different test conditions so as to cover the entire range of boards being tested.

Table II shows results of tests on ½-inch boards using the 1-inch ball and ½-inch ball indenters at a 6-inch height of drop and the 1-inch ball indenter at a 3-inch height of drop. Column 2 shows results obtained with the use of a ½-inch ball indenter at a 6-inch height of drop, and it is apparent that this was not suitable for rating ½-inch boards. These conditions did not possess the required sensitivity to bring out individual differences between them.

Column 3 of Table II shows results of tests at a 6-inch height of drop with a 1-inch ball indenter. Here, there appears to be a difference of five impacts between the weakest and strongest boards. However, no differentiation is shown between the boards in the medium strength group. Results of tests using a 1-inch ball indenter at a 3-inch height of drop are shown in column 4. The range here is 26 impacts between the highest and lowest strength boards, and some differentiation is shown between the boards of the medium strength group. These test conditions were considered satisfactory for rating ½-inch boards and were selected for use in the adopted test procedure.

*Support of Specimens and Relation to Test Point.* In a test of this nature it is evident that the rigidity of the test specimen at the test point may greatly affect the final test results. Thus, for instance, if the supports of the test specimen were parallel and 16 inches on center, the results might be far

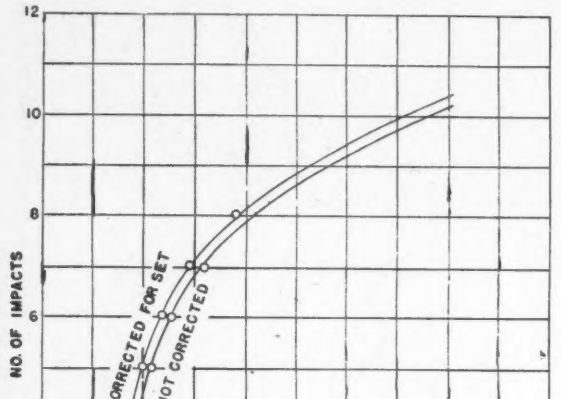


FIG. 5

Effect of Error Due to Neglecting Increased Height of Drop Caused by Set. 3-lb., ½-in. Ball Indenter—6 in. Height of Drop on Sheathing Board No. S-5—18 in. by 18 in. Specimen

different than they would be if these same supports were only 4 inches on center, with the test point in the middle of the supports in either case. Likewise, if the test specimens were clamped rigidly in place for the test, the results would be different than they would be for free or flexible supports. In order to compare the test results, it is necessary to select some uniform type of support and a location of test point in reference to the supports which can be relied upon for reasonably uniform results. Figures 3 and 4 shows two different methods of supporting the sample with typical results for each. The small circles and adjacent figures show the location of the test point, and the final results. In each case, a 3-pound, ½-inch diameter indenter was dropped from a height of 6 inches, and the number of drops required for failure is recorded adjacent to the test point.

As will be noted in Fig. 3, the test sample was nailed

TABLE I.—EFFECT OF HEIGHT OF DROP WITH THREE DIFFERENT INDENTERS 18-INCH BY 18-INCH SPECIMENS OF BOARD NO. S-5; 3-POUND INDENTER

| Height of Drop, inches | Average Number of Impacts to Cause Failure: ½-inch Ball Indenter | 1-inch Ball Indenter | 1-inch Flat-faced Indenter |
|---|---|---|---|
| 6 | 11 | 19 | 78 |
| 8 | 6 | 13 | 47 |
| 12 | 4 | 5 | 11 |

TABLE II.—EFFECT OF HEIGHT OF DROP AND INDENTER SIZE ON THE IMPACT STRENGTH OF ½-INCH INTERIOR FINISH BOARDS; WEIGHT OF INDENTERS—3 POUNDS

| Type of Board | Number of Impacts Required to Cause Failure: 6-inch Height of Drop ½-inch Ball Indenter | 6-inch Height of Drop 1-inch Ball Indenter | 3-inch Height of Drop 1-inch Ball Indenter |
|---|---|---|---|
| F-2 | 3 | 7 | 30 |
| F-5-1 | 2 | 4 | 11 |
| F-8 | 2 | 4 | 10 |
| F-5-2 | 2 | 4 | 9 |
| F-7 | 2 | 2 | 4 |

to parallel supports, 8 feet long and 16 inches apart, with a header at top and bottom. For the points located midway between these supports and at a reasonable distance from the ends, 100 to 156 drops were necessary for failure. For the points approximately one-quarter distant from one support to the other and at a reasonable distance from the ends, 39 to 64 drops were required. For the points which were 4 inches from each support at the corner of the test specimen, 11 to 13 drops were required. It is evident from these results that there will be a wide variation in the test results depending upon the method employed of clamping the sample and the location of the test point in relation to these clamps.

The test sample in Fig. 4 was rigidly clamped on the four edges in a frame, leaving a final test sample within the frame which was 16 inches square. The test points varied from 2 to 5 inches from the edges of the samples, as indicated in the diagram. In this case, the test results are very much more uniform than were those shown in Fig. 3 for various locations. The fact that the board was rigidly clamped around all edges appears to account for this greater uniformity.

From these tests, together with others on smaller test areas, it was decided to use 18-inch square samples clamped in a test frame with a 1-inch wide clamp, thus giving a 16-inch square sample similar to that shown in Fig. 3. For each test specimen four points were used which were at the four corners of a square on the test sample whose sides were each 2 inches from and parallel to a given edge of the free test sample.

One variable in the testing method is the effect of permanent set on the height of drop for the impacter. For instance, the impacter makes a permanent dent in the

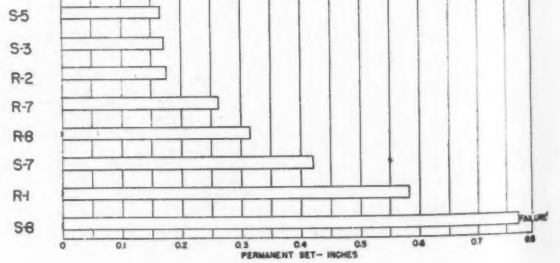


FIG. 6

Comparison of Ratings of Nine Sheathing Boards Showing Number of Repeated Impacts Required to Cause Failure. 3-lb., ½-in. Ball Indenter —6 in. Height of Drop

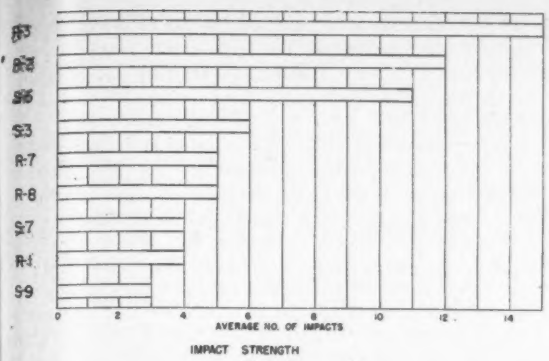


FIG. 7

Comparison of Ratings of Nine Sheathing Boards Showing Permanent Set after Three Repeated Impacts. 3-lb., ½-in. Ball Indenter—6 in. Height of Drop

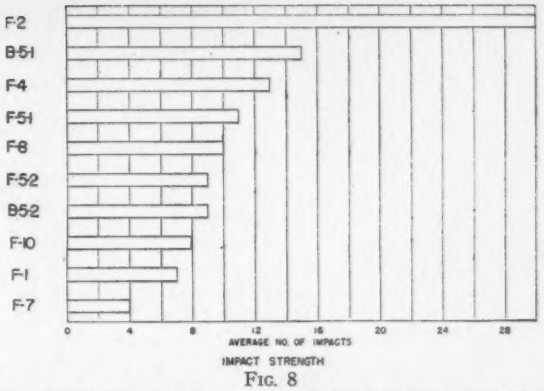


FIG. 8

Comparison of Ratings of Ten ½-in. Structural Insulating Boards Showing Number of Repeated Impacts Required to Cause Failure. 3-lb., ½-in. Ball Indenter—3 in. Height of Drop

material and to this extent the total drop increases each time, provided the impacter is raised to its initial position before dropping. In order to determine the effect on the initial set, a series of tests were run using a 3-pound ball, ½-inch diameter impacter with a 6-inch initial height of drop. The results of these tests are shown in the curves of Fig. 5. From these results it is evident that the effect of permanent set may be neglected for ordinary test purposes.

### Ratings with Apparatus and Procedure Adopted

In rating the impact strength of a group of boards it is desirable to do so on the basis of a single set of test conditions. Testing under these conditions should consume only a reasonable length of time and should be adaptable to the range of materials to be rated. In making the following comparative ratings a method of repeated blows from a given height was used. The number of blows before failure indicates the strength of the material. For the 25/32-inch material the 3-pound indenter with ½-inch diameter round ball point and a 6-inch height of drop were used. For ½-inch insulating board a 3-pound indenter with a 1-inch diameter ball and a 3-inch height of drop were used.

*Ratings of Nine Sheathing Boards.* The results of the tests on nine plain and treated sheathing boards using the above test conditions are shown in the chart of Fig. 6. In this chart the boards are designated by numbers and are compared on the basis of the average number of repeated impacts required to cause failure. The materials are arranged in descending order of impact strength, the larger bars indicating the boards of greater resistance to impact loading.

The bar chart of Fig. 7 shows the same materials as in Fig. 6 rated according to their permanent set after a series of repeated impacts, the shorter bars indicating those materials which showed the least set. The order of impact strength shown in Fig. 6 and 7 is the same by both rating methods, with the exception of board No. R-2 which drops from second place in Fig. 6 to fourth place in Fig. 7. However, the actual difference in permanent set between second place board No. S-5 and fourth place board No. R-2 is small.

*Ratings of Ten ½-inch Boards.* In Fig. 8 ten ½-inch boards were rated by the total number of repeated impacts required to rupture the materials. The average set after four repeated impacts is the method of rating used in Fig. 9. The strength order of the boards is substantially the same by both methods, with the exception of board No. F-4 which moves from third place in Fig. 8 to first place in Fig. 9. The set differences between board Nos. F-2, B-5-1, and F-4 are small.

The photographs shown in Fig. 10 indicate the type of break that occurs in insulating boards when tested for impact strength by the method described in this report. The top row shows the impact side of three typical interior finish boards after repeated impact tests to failure with a 3-pound, 1-inch diameter impacter and a 3-inch height of drop. Specimens 1, 2, and 3 are board Nos. F-2, F-5-2, and F-7, respectively. The middle row of photographs shows the opposite surface of the board from the first row after failure, and the lower row shows the same as the second row, except that the broken pieces are removed from the test area in order to show the range around the test point to which the board is affected.

## Concentrated Load Strength

The concentrated load strength of insulating board may be defined as its resistance to pressure on a small surface area under which there is no rigid backing. This type of loading may be encountered in actual service either when insulating board used as the final interior finish of the wall surface or during the construction period when it is being used as a plaster base. The resistance to concentrated load is a definite property and should not be confused with surface hardness or with the impact strength of the board. A test method for surface hardness involves the rigid support under the point of test, whereas both the impact strength and concentrated load tests require free movement of the board under the point of test. The impact strength test requires a dynamic type of loading, whereas the concentrated load test requires a static type of loading.

### Test Methods Available

There are several types of test apparatus and test methods in use which might be adapted to this particular type of test on insulating board. Since the properties of insulating board are quite different from those of many other types of materials, such as the metals, a suitable test method and test apparatus will naturally be different even though the same general ends are sought. In general, the problem is to select some suitable method for supporting the test sample and then to apply a load at a uniform but moderate rate to a properly selected area of the surface and to observe the performance of the material under the application of this load. Some of the variables to be considered are: (a) the method of supporting the material and the relation of the supports to the area over which the load is applied; (b) the type and size of indenter or contact area between the load-applying device and the surface of the board;

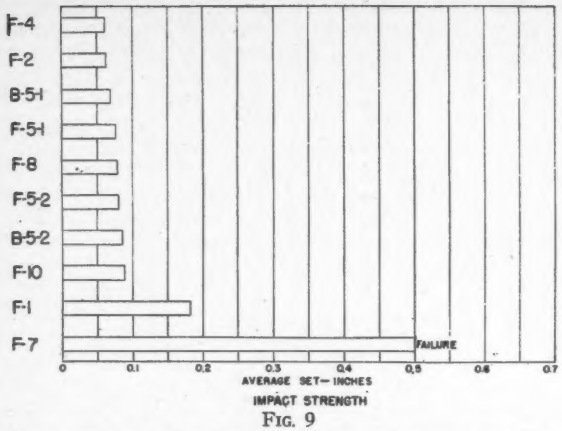


FIG. 9

**Comparison of Ratings of Ten ½ in. Structural Insulating Boards Showing Permanent Set after Four Repeated Impacts. 3 lb., 1 in. Ball Indenter—3 in. Height of Drop**

(c) the rate at which the load is applied; and (d) the criteria for rating the results of the test.

### APPARATUS ADOPTED

Having in mind the flexibility necessary for investigating the different variables involved, the concentrated load testing machine and specimen holder illustrated in Fig. 11 were designed and constructed.

The load is applied to the material by a geared motor device and is measured with a calibrated spring dynamometer of 500-pound capacity. A removable indenter, or contact point, is attached to the lower end of the dynamometer by a ⅜-inch stud. The indenter shown consists of 1-inch round steel with a 1-inch ball-bearing contact point brazed to its lower end.

The platform for carrying the specimen, the framework for the drive mechanism, and all other parts are rigidly mounted on steel columns, and the machine is arranged for flexibility of the drive, the type of specimen support, and the positioning of the indenter or contact point upon a given specimen. The specimen holder shown in the photograph is the same as that finally adopted for the impact strength test.

### SPECIMEN SIZE AND POINT OF LOADING

In order to determine the effect of specimen size, method of clamping the specimen to the supports, and the point of loading the specimen in relation to the supports, the same design of test specimen supports and location of loading points were used as for the impact test development. Fig. 12 shows the results for an 8-foot section supported by two longitudinal supports, 16 inches on center, and Fig. 13 shows the results for an 18-inch square specimen supported securely around the edges in a 1-inch wide frame, giving a 16-inch square test specimen. In each case, board No. B-5-1 was used with a 1-inch diameter ball indenter, and the load was applied at the rate of ¾ inch per minute. The locations of load application, together with the load at the point of failure in pounds, are shown in Figs. 12 and 13.

As will be noted by an inspection of the results of these two tests, there was but very little variation between the values obtained for the different points over the two test specimens. This is quite different from the results observed for the impact test on the same types of test specimens. While from these tests it is evident that the arrangement of the specimen and the type of support used are not as important for the concentrated load test as for the impact test, still the same test specimen and holder, i.e., the ones shown in Fig. 13, were selected as for the impact test and also, the same location of test points, i.e., four points for each specimen located at the crossing points of lines drawn 2 inches from each edge of the specimen, were used.

### TYPE OF INDENTER

To determine what effect the type of indenter would have on the failure loads, tests were run on five different ½-inch boards with three types of indenters. The results of these tests are shown in Table III. From these tests and others on 25/32-inch sheathing the 1-inch diameter ball type of indenter was selected. However, it may be advisable with other boards of a different texture to use the ½-inch ball or perhaps the 1-inch flat-faced indenter. Any one of these would apparently give relative ratings of the boards so long as the same indenter was used and the other test conditions were maintained throughout the test.

TABLE III.—EFFECT OF TYPE OF INDENTER ON FAILURE LOADS OF ½-INCH BOARDS

| Type of Board | Type of Indenter | | |
|---|---|---|---|
| | ½-inch Ball | 1-inch Ball | 1-inch Flat-faced |
| B-5-1 | 89 | 123 | 166 |
| F-2 | 66 | 92 | 126 |
| F-10 | 64 | 87 | 102 |
| F-8 | 46 | 53 | 75 |

### RATE OF LOADING

The rate at which a concentrated load should be applied to a specimen of insulating board was considered a factor to be investigated. By changing the size of the pulleys on the electric motor and speed reducer different speeds were obtained, and tests were made with speeds varying from ¾ inch to 5 inches per minute. The general results of these tests were found to be as follows:

EFFECT OF RATE OF LOADING ON FAILURE LOADS ½-INCH INSULATING BOARD USING 1-INCH BALL INDENTER

| Rate of Loading, inches per minute | Range of Failure Load, load in pounds | Average Load at Failure, load in pounds |
|---|---|---|
| ¾ inch per min. | 122 to 124 | 123 |
| 2 inches per min. | 127 to 135 | 131 |
| 3 inches per min. | 125 to 135 | 130 |
| 5 inches per min. | 124 to 137 | 131 |

From the above results the rate of loading of ¾ inch per minute was selected for further tests. However, it appears that some speed above this would be equally satisfactory.

### METHOD OF SUPPORTING TEST SPECIMEN

From the results shown in Fig. 12 and 13 the method of supporting the test specimen did not seem to be too important. However, the method finally selected was to clamp the specimen in an 18-inch square frame, leaving

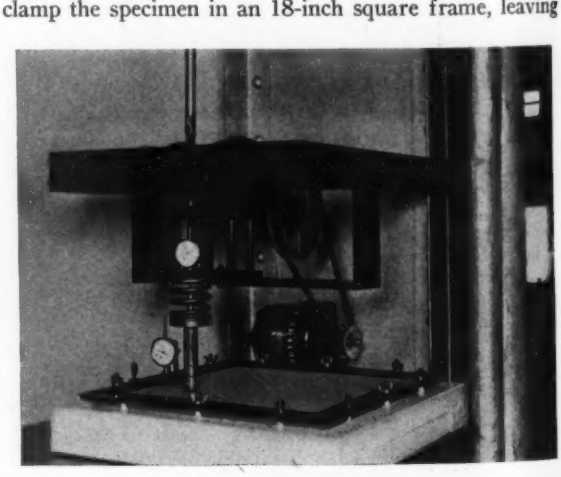

FIG. 11

**Concentrated Load Strength Testing Machine**

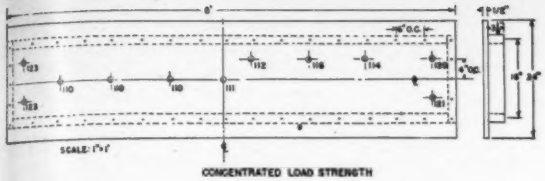


FIG. 12

Large Wall Section of ½-in. Board No. B-5-1 Showing Failure Loads at Various Points. 1-in. Ball Indenter; Rate of Loading=¼ in./min.

a 14½-inch square free test sample, the same as that used for the impact strength test.

### TYPICAL RATINGS WITH APPARATUS AND PROCEDURE ADOPTED

*Ratings of Nine Sheathing Boards.* In order to compare the results obtained by the apparatus and test method adopted, nine different types of 25/32-inch sheathing boards were selected and tested. A 1-inch ball indenter was used, and the load was applied at the rate of ¼ inch per minute. The results of these tests are shown in Table IV.

TABLE IV.—RATINGS OF NINE SHEATHING BOARDS

| Type of Board | Load at Failure, lb. |
|---|---|
| R-2 | 190 |
| R-3 | 178 |
| S-5 | 172 |
| S-3 | 145 |
| R-8 | 138 |
| R-7 | 134 |
| S-9 | 126 |
| S-7 | 105 |
| R-1 | 102 |

*Ratings of Ten ½-inch Insulating Boards.* Ten typical ½-inch insulating boards were selected and rated for maximum concentrated load strength using the procedure as outlined. The ten boards were all tested to failure using a 1-inch ball indenter and applying the load at the rate of ¼ inch per minute. The results of these tests are shown in Table V.

TABLE V.—RATINGS OF TEN ½-INCH INSULATING BOARDS

| Type of Board | Load at Failure, lb. |
|---|---|
| B-5-1 | 123 |
| F-8 | 95 |
| B-5-2 | 95 |
| F-2 | 92 |
| F-4 | 88 |
| F-10 | 87 |
| F-5-1 | 83 |
| F-5-2 | 81 |
| F-1 | 71 |
| F-7 | 53 |

Note: For both Tables IV and V the loads were applied with a 1-inch diameter ball indenter at the rate of ¼ inch per minute. Tests were made on each sample giving the average results as shown in the tables.

## Conclusions

The resistance of insulating board to impact and concentrated loads represents two different but very important properties of insulating boards as they are often used in practice. In developing the proposed apparatus and test procedure consideration was given to practical conditions in which the board might be subject to these particular stresses. The prime problems in both cases were, first, to select some form and shape of instrument to contact the surface of the material which would simulate the effect of an instrument or object which might contact the board when in use; second, to decide on some method of supporting the sample which would be equivalent to typical supports of the material in practice and which would give results which would be reasonably consistent for various types and kinds of materials. In each case, it was necessary to have the supports on each side and at some distance from the contacting point. The rigidity with which the sample was supported proved to be a much more important factor for the impact strength test than for the concentrated load test. Also, the distance from the supports, which actually affects the rigidity, was more important with respect to the former test. The third requirement was to select a suitable rate of application for the load in the two cases. For impact strength the rate of application, which was considered as the weight of the impacter together with the height of drop, seemed to have more effect on the final test results than it did for the concentrated load strength test, in which the movement of the load only was considered as the rate of application.

While in these recommendations definite indenter sizes, rates of travel, and methods of supporting the sample have been selected, it is apparent that in laboratory use other forms of indenter or methods of supporting the sample may prove to be better adapted to some of the insulating boards now on the market. The authors have an open mind with respect to suggestions as to changes in either the test apparatus or in the methods of procedure.

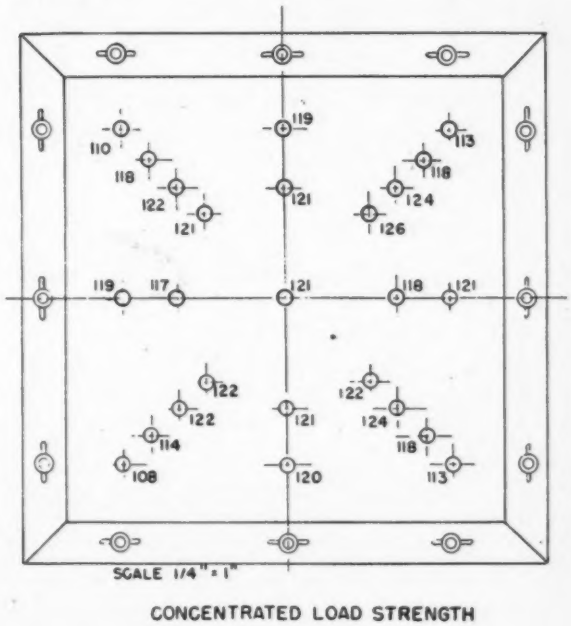


FIG. 13

Effect of Point of Loading on Failure Load of =-in. Board No. B-5-1 1 in. Ball Indenter; Rate of Loading = ¼ in./min.

# Temperature Measurement and Control*

By John B. Chandler[1]

## Abstract

*The advantages and disadvantages of various types of mechanical and electrical temperature measuring devices are discussed. The mechanical units utilize liquid filled, vapor tension, and gas filled systems while the electrical equipment is based on the thermocouple and the resistance bulb. The purpose of this paper is to provide a basis of comparison of the available types of*

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Commodore, New York, N. Y., Feb. 23-26, 1948.

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*temperature measuring devices, their advantages and disadvantages, and a few of the more common applications of each. The temperature measuring devices are divided into two classes: (1) mechanical, or filled system thermometers, and (2) electrical, or pyrometers and resistance thermometers.*

## Filled Systems

As a means of measuring temperature, the idea of using a pressure measuring device and including it in a closed system filled with an expansible medium so arranged that a change in temperature at a sensitive surface results in a change in pressure in the system, is very old. However, the development of these ideas into forms which can be used industrially has been confined to this century. In industrial practice, almost all of these temperature measuring systems use some form of a Bourdon tube, usually circular, spiral, helical, or involute. However, the differences between one type of system and another may be assigned to the filling medium rather than to any mechanical peculiarity.

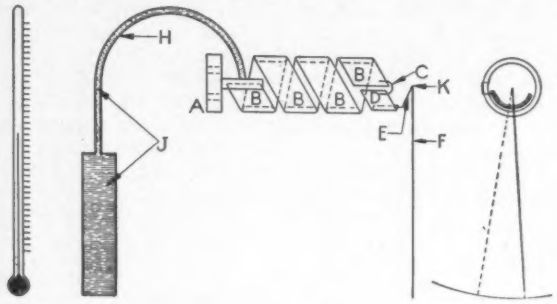


FIG. 1
**Principle of Operation of Class I Liquid-Filled System**

Before considering the filling mediums, the mechanical components which are basically the same for all types of thermometer systems are considered. There is a bulb of suitable construction to stand the mechanical and chemical action of the application. This is connected by a flexible capillary tubing to some type of helical pressure measuring element. This helical element is mounted in a protecting case and connected by a linkage to a pen arm or pointer. The action is such that as heat is applied to the bulb, the medium inside expands through the capillary and causes the helix to unwind. This motion in turn moves the pen arm. It is customary to provide some method of multiplying the angular motion of the helix to allow the pen to move across the chart for a desired change in temperature.

### Liquid Filled Systems

The first type of filling medium to be discussed is liquid, referred to as the Class I System. (Fig. 1) Various liquids are used in this type of system, for example alcohol and mercury. The most important factor is that the entire system must be full. The liquid filled system is used frequently because of its inherent high pressure which furnishes a maximum of torque to the helical spring. It also may be used with a relatively small bulb which is often a factor because of space limitations. Another advantage of this system is that it may be used for very short total ranges thus giving a very open reading on the chart.

The major disadvantage of the Class I system is that the tubing and helix are subject to ambient temperature errors for which there must be compensation. It is common practice in all Class I instruments to provide a bimetallic spring inside the case to compensate for changes in room temperature which might affect the helical spring. However, when the tubing length extends over 10 feet it is necessary to compensate for the ambient temperatures to which the tubing is exposed. There are two common ways to do this. One shown in the sketch (Fig. 2) provides two helical springs and two capillaries running side by side in the protection tubing. One capillary is connected to the bulb and one terminates outside of the bulb. As the helical springs are connected in opposition, only changes in bulb temperature will cause the pen to move. Any changes in tubing temperature will affect both springs the same, and no pen movement will occur. (Fig. 3) This so-called fully compensated Class I system can be furnished with tubing lengths up to 200 feet.

The second type of compensation utilizes an invar wire which is drawn through the capillary. This wire tends to reduce the tubing volume which cuts down the chance for error. Also by correctly proportioning the area of the invar to the area of the bore, the differential of expansion between the two can be made approximately equal to that of the liquid.

In considering mercury as liquid filling medium, it must be remembered that its characteristics are entirely different from other liquids. As it has a high coefficient of expansion, it naturally produces a high pressure, often as high as 2500 p.s.i. This high pressure naturally utilizes an extremely stiff spring, and gives an element with much power. Because of its chemical nature, the entire system must be of welded steel construction. Inherently a steel bulb does not have as good heat transfer characteristics as copper, particularly in lower ranges. However, the mercury system does have the advantage of operating at temperatures as high as 1000° F.

### Vapor Tension Systems

The second type of system, the vapor tension system, referred to as Class II, is probably the simplest. It is characteristic of this class that it has an increasing scale chart. This is due to the basic principle of operation, which consists of filling the moving element, capillary and part of the bulb, shown in Fig. 4, with a volatile liquid after the system has been evacuated. As temperature is applied to the bulb, this liquid is vaporized producing a pressure. The important point here is that the bulb always must contain some liquid. The vapor pressure naturally varies with the type of medium being used. Such a system, of course, starts with zero pres-

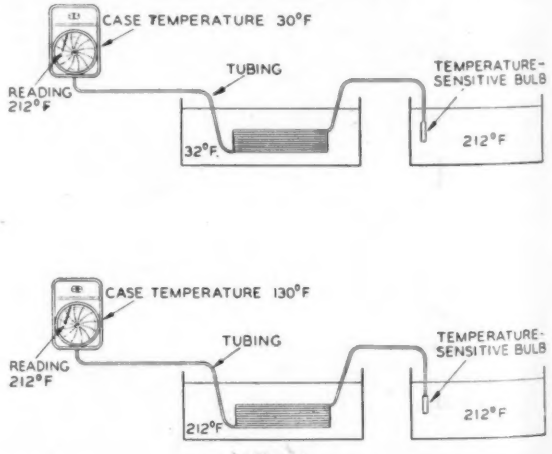


FIG. 3
**Tests on Temperature along Capillary on Fully-Compensated Liquid-Filled System**

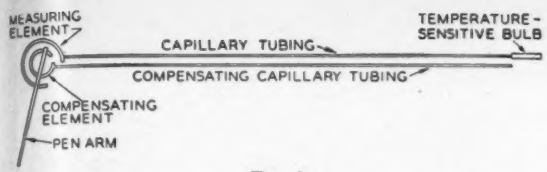


FIG. 2
**Features of Class I Fully-Compensated Liquid-Filled System**

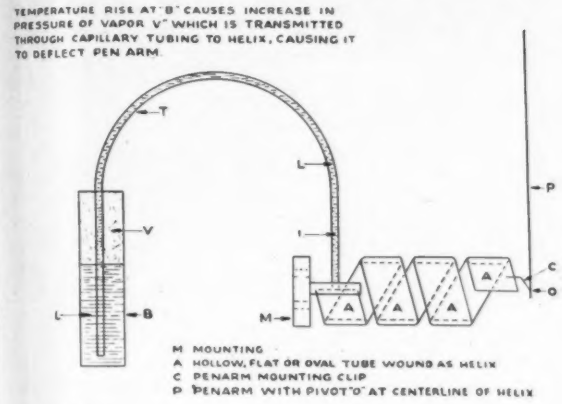


FIG. 4
**Principle of Operation of Class II Vapor-Tension System**

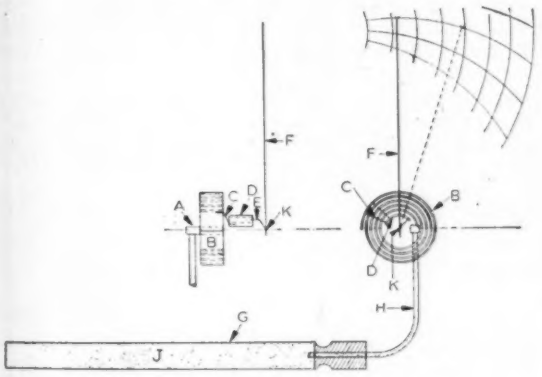


FIG. 5
**Principle of Operation of Class III Gas-Filled System**

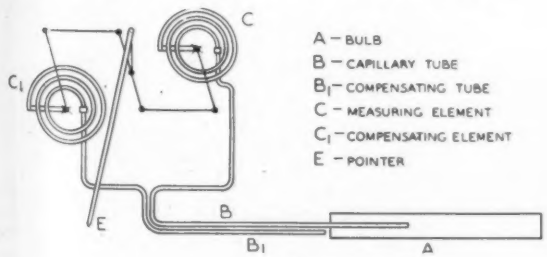


FIG. 6
**Principle of Operation of Class III Small Bulb Gas-Filled System**

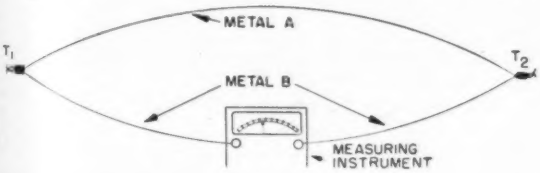


FIG. 7
**Basic Thermoelectric Pyrometer**

sure, and builds up on a logarithmic curve.

One of the advantages of the Class II system is the wide open scale at the top of the chart. Therefore, it is very important to use care in picking a suitable chart for the range involved. Another advantage is that long tubing lengths can be supplied (up to 250 feet) and that the tubing does not have to be compensated. As the tubing is filled with liquid, any change in ambient temperature causes the liquid to expand, and forces it back into the bulb. Also, the bulb may be very small. It is only necessary for the bulb to be large enough to take care of expansion and contraction of the liquid in the tube, and yet never be full or empty.

The increasing chart can also be a disadvantage in some cases. If one is as interested in the low readings as the high ones, this system is not satisfactory.

GAS FILLED SYSTEM

The third basic thermometer system is completely gas-filled (Fig. 5). The system is evacuated and filled with a gas, usually nitrogen, under atmospheric pressure. This means that the Bourdon tube starts from atmospheric and builds up to some predetermined pressure. This system behaves directly according to Boyle's Law producing a linear curve.

The range limitations for the Class III system are very broad, going from —40°F. to +1200°F. The upper limit is more dependent on the physical bulb construction, than upon the filling medium.

Tube compensation in this type of system is provided for by the bulb design. If a ratio of 40:1 is maintained between bulb volume and tubing volume, the effect of ambient temperature changes along the tubing will be negligible. This, of course, results in a comparatively large bulb, which is the main disadvantage of this type of system. A variation of the Class III system, called "the small-bulb Class III" utilizes the same type of tubing compensation as the Class I (Fig. 6). As nitrogen is inert, copper bulbs may be used in all but the highest ranges, unless exposed to chemical attack. This provides maximum sensitivity.

To summarize their general advantages and disadvantages, the main points in their favor are: (1) Low initial cost, and (2) Simplicity of construction, resulting in low maintenance cost.

The disadvantages of filled systems are: (1) Damage to capillary or bulb necessitates complete system replacement, and (2) Not easily adaptable to centralized control.

## Electrical Temperature Measurements

In measuring temperatures electrically, there are two basic methods, the thermocouple and the resistance bulb.

The principle of thermoelectric action is shown in Fig. 7. If two junctions in a closed electric circuit made of two dissimilar conductors are at different temperatures, a millivoltage will be developed which will be proportional to the temperature. It is common practice to have the cold-end mounted in the instrument, and automatically compensated for ambient temperature changes. The measuring instrument shown may be a simple galvanometer or a self-balancing potentiometer.

The thermocouple is the basis of pyrometry, and is usually considered a high temperature measuring apparatus. However, its effective range is from —300 to +3000° F., the lower range being limited only by the ability to calibrate it.

Metals for thermocouples have been selected to give the largest possible E.M.F., bearing a linear relation to temperature, while possessing resistance to melting, corrosion, and shifting characteristics. Platinum possesses all of these qualities, but its high cost has caused

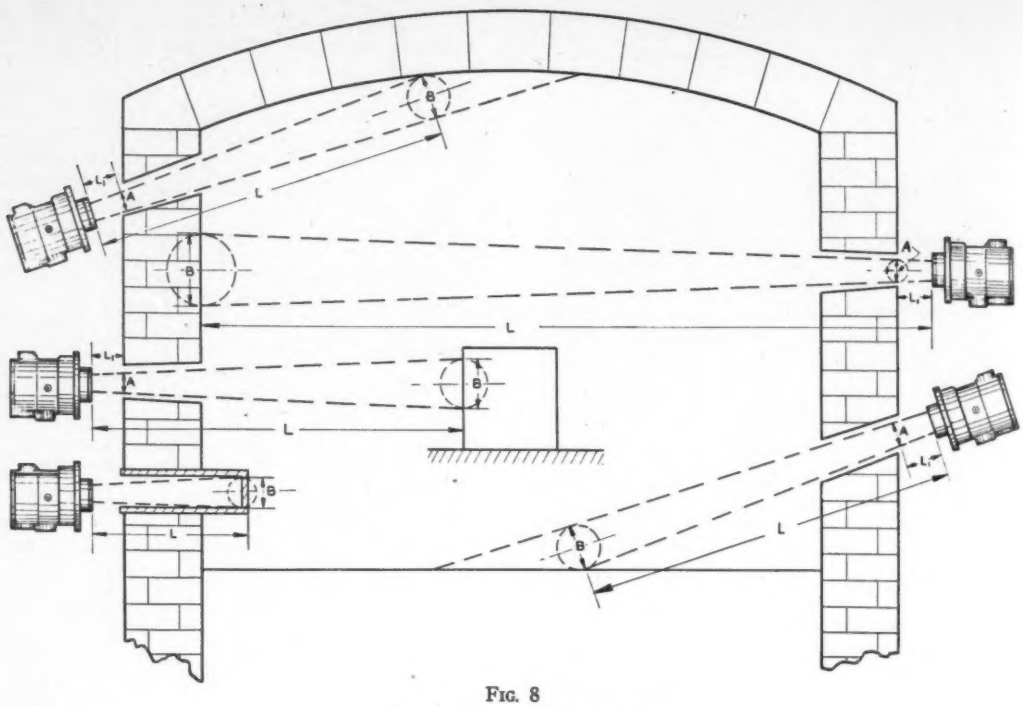


FIG. 8
**Method of Use of Radiation Units**

the development of base metal thermocouples. The more common ones with their usual temperature ranges are:

| | |
|---|---|
| Chromel-alumel | —300 to 2200° F. |
| Iron-constantan | —300 to 1400° F. |
| Copper constantan | —300 to 570° F. |

The accuracy of this type of measurement is only dependent on the average commercial thermocouple, and is usually expressed as ±2%. It is possible to buy "standard thermocouples" with calibration curves, which greatly improves the accuracy.

The advantages of thermocouples are: (1) Simplicity and low replacement cost. It is often possible to improvise a thermocouple from the lead wires until a new one is available. (2) Long leads may be used between the couple and the instrument.

The disadvantages are: (1) Special lead wire materials must be used, and (2) A relatively long scale must be used in order to develop sufficient E.M.F. for the instrument.

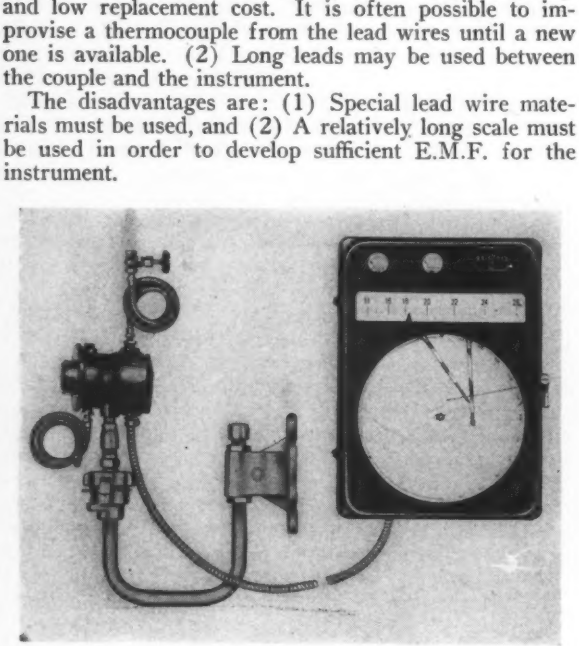

FIG. 9
**Radiation Pyrometer System**

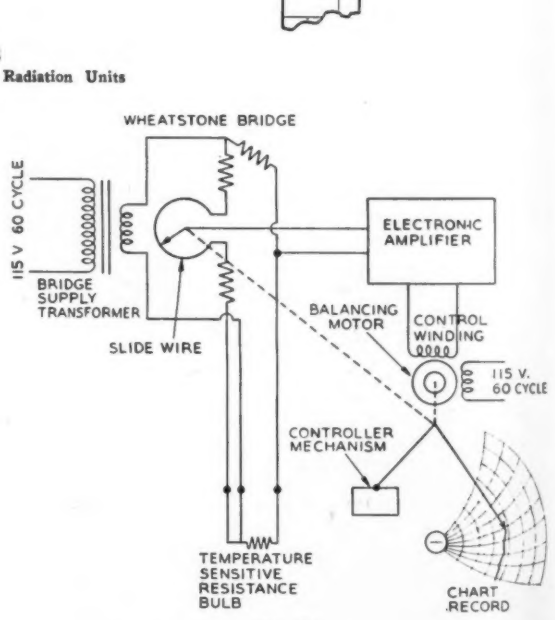


FIG. 12
**Principle of Operation of Dynamaster Resistance Thermometer**

## RADIATION UNITS

While considering the thermocouple, consideration should be given to the radiation unit. This is primarily an element for measuring temperatures which are too high for a thermocouple. The common commercial types consist of either: (1) A single fine wire thermocouple or (2) A thermopile, consisting of a number of couples in series, enclosed in an evacuated glass tube. This tube is mounted in a suitable housing which also contains a lens system.

The lenses are focussed on the radiant materials as shown in Fig. 8. They are so arranged to concentrate the radiant heat on the thermocouple or thermopile. This element is used in ranges from 1000 to 5000°F. Again the maximum is limited by our ability to calibrate the

readings. Figure 9 shows a radiation unit connected to a potentiometer recorder.

### Resistance Bulbs

The most accurate electrical means of measuring temperature is considered to be the resistance bulb. This consists basically of a coil of nickel or platinum wire mounted in a suitably protected bulb. It is connected to the measuring instrument by three copper wires. A current is fed through the resistance bulb, and it is connected in one leg of a Wheatstone bridge, which measures the resistance encountered in the bulb. This varies with the temperature.

The range of a resistance bulb is from —300 to +1000°F. and higher. The accuracy of measurement is considered to be ±0.5°F. This of course is the biggest advantage of this type of measuring element. Its other advantages are: (1) Uses ordinary copper wire for leads, (2) Bulbs are easily replaced, (3) Accuracy not affected by lead length, and (4) Adaptable to narrow ranges.

The biggest disadvantage is the high cost of bulbs, compared to thermocouples.

## Electrical Instruments

When using the thermocouple or resistance bulb, there is a choice of measuring instruments between the simple millivoltmeter and the potentiometer. The millivoltmeter is fundamentally an indicating instrument of relatively low cost. It uses the D'Arsanval principle of a coil suspended in a magnetic field, which assumes a position depending on the E.M.F. flowing in the coil. It has an accuracy of 1%. This instrument is used as an indicator or indicating controller when cost is a consideration. (Fig. 10). However, it is not as accurate or as rugged as a potentiometer. Also the instrument must be calibrated for the particular length of leads used. The potentiometer is the most popular instrument today for use with resistance bulbs or thermocouples. The potentiometer is primarily a bridge circuit with mechanical or electronic means for determining an unbalance, and

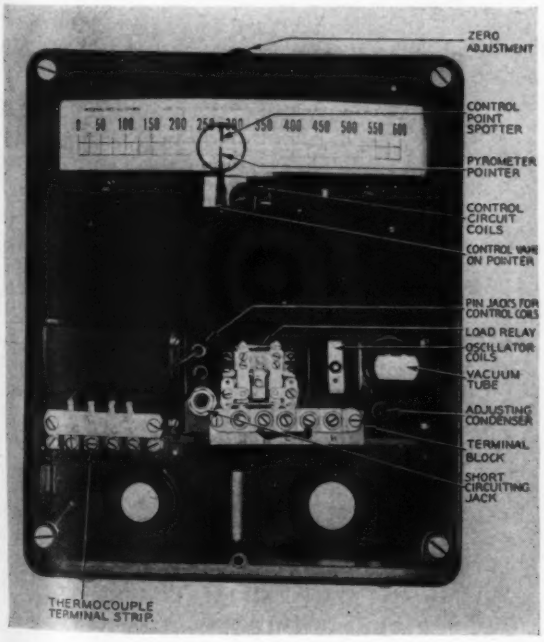


Fig. 10
**Pyrometer Controller (Electronic) Open View**

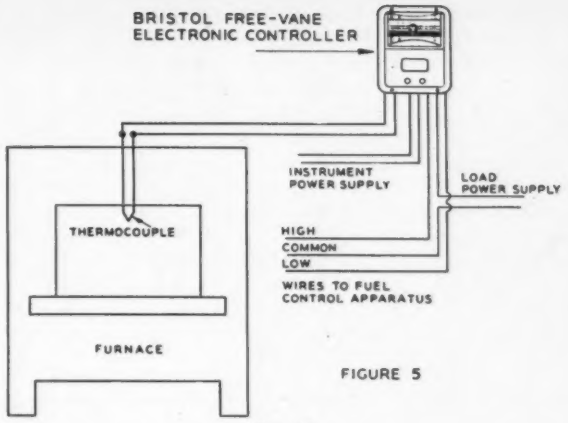


Fig. 14
**Electronic Pyrometer Controller Applied to Furnace**

a means for positioning a slide-wire to rebalance the bridge. The slide-wire is usually linked to the pen arm so that these movements are recorded as temperature changes.

The ordinary potentiometer can be furnished with one or all of these features: (1) indicating, (2) recording, and (3) pneumatic or electric control.

The accuracy of the potentiometer is considered to be ⅓ to ½ of 1%. It is usually more accurate than any thermocouple used with it. Because of the self balancing principle, the length of lead wire is automatically compensated for. This greatly improves the utility of the instrument.

Potentiometers are available in two basic types: (1) The galvanometer type which uses a galvanometer to detect the unbalance in the circuit, and (2) The electronic type which uses a vacuum tube amplifier to detect and amplify the unbalance.

The relative merits of the two can be summed up by the words "speed" and "cost." The galvanometer type is inherently slower in response, but is in most cases less expensive than the electronic type. The electronic potentiometer balances very rapidly, and has an extremely fast pen travel. It is well suited to applications where the temperature changes rapidly, or where it is desirable to record a number of values in a short period of time. Figure 11 shows a typical electronic resistance thermometer. It will be noted that the slide-wire drive motor is the only moving part. The circuit of this instrument is shown in the next sketch, Fig. 12. In discussing the merits of the potentiometer, there is one advantage which is often overlooked. That is the possibility of integration of readings. By the inherent nature of the circuit, it is possible to: (1) average two or more temperatures, (2) add two or more temperatures, and (3) take the difference of the readings.

Another definite advantage of the potentiometer is its adaptability to centralization. As it is connected to the primary measuring element by wires, it is a simple matter to mount the instrument on a panel board, and run the lead wires through conduit for 500 or 1000 feet. If the bulb or lead wire is damaged, it is a simple matter to replace either one. Its other advantages are: (1) Ease of making range changes, and (2) Convertible to other uses such as pH, tachometer, and power measurements. This allows standardization on a smaller number of instrument types.

In a final comparison between the filled systems and the electrical temperature measurements, the electrical potentiometer is a versatile instrument, adaptable to centralization and to changing conditions. On the other

hand the filled system themmometer is a lower cost instrument, limited to very specific uses, and best adapted to decentralization.

### Applications

Some of the more unusual applications in pulp and paper mills which have been developed for temperature measuring systems are considered.

The first is a means of determining the pressure condition of a kraft digester. As one of the reasons for gassing-off a kraft digester is to expel air and noncondensible gases, a need existed for detecting the presence of these gases. A two-pen recorder was developed with one pen linked to a conventional pressure element, and the other pen linked to a water-filled Class II system, with the bulb in the relief line.

The thermal system shows the pressure of pure steam at the existing temperature. The pressure element measures the actual pressure in the digester. A condition of false-pressure causes a differential between the pens. Using a differential controller, this scheme has been adapted to automatically relieve the digester.

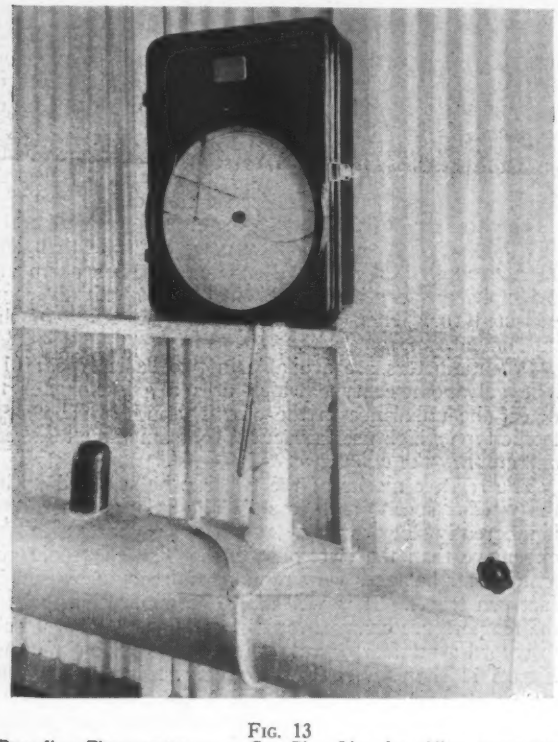

FIG. 13
Recording Thermometer on a Gas Pipe Line for aiding computation of Gas Volume

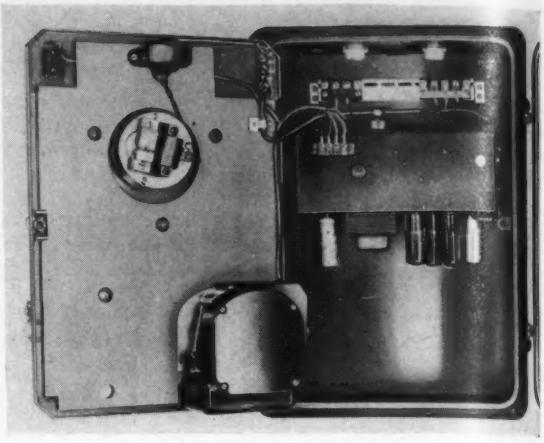

FIG. 11
Dynamaster Resistance Thermometer

A popular application for the radiation pyrometer occurs in the lime burning process of a kraft mill. As lime is usually burned in a rotary kiln, it has been difficult to obtain true temperatures of the lime by means of thermocouples. Therefore, a radiation unit is placed at the hot end of the kiln, focussed on the lime just before it discharges. This temperature recorded on a potentiometer is an excellent guide to the operator firing the kiln. It has also been successfully used to automatically control the fuel feed, obtaining a more uniform product with lower fuel costs.

The resistance thermometer is used very extensively in sulphite and kraft cooking. The bulb is located in the circulating line at the discharge of the heater. The recorder controller is located up on the digester operating floor. As all of the liquor in the digester passes continually through the circulating system a very representative temperature measurement is obtained. To go a step farther a program controller is used to operate the steam valve. The digester operator cuts the cooking cycle on an aluminum cam, which is placed in the controller. This allows duplication of any desired cooking cycle with an increased uniformity of pulp and a saving in steam.

# Methods for Measuring Liquid Level*

By N. W. Gollin[1]


### Abstract

*The successful operation of most batch operated and continuous processes depends on accurate measurement and control of many variables, one of which is liquid level. Anyone familiar with the operation of an evaporator, a digester, or coating machine knows the importance of accurate level measurement. There are three basic methods commonly used for measuring liquid level regardless of whether it is to be controlled, recorded, or only indicated.*

*The first and most direct method is to measure the position of the surface of the liquid. The second, a very popular method which can be very accurate is to indirectly measure the liquid level by measuring the hydrostatic pressure at the bottom of the vessel. The third method, used on relatively small vessels containing liquids and slurrys which cannot readily be handled by other methods, is to weigh the entire vessel and contents. In each of these three methods some of the standard in-*


* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 22-26, 1948.

[1] Taylor Instrument Co., Rochester, N. Y.

*struments and devices readily available are described. Many of these instruments are easy to understand and relatively simple in their operation but to be used successfully may depend on the installation or special operating technique. For such measurements extended explanations are given.*

Some of the elementary devices used in measuring liquid level are: sight gage glasses; staff gages; dip sticks, float and chain and level cocks. These together with others not so simple in operation which make use of electric contacts, light beams, capacitance, conductivity, etc., are quite completely described in other literature and will not be discussed here.

## Surface Position

A direct method for measuring liquid level is by means of a float which follows the rise and fall of the liquid surface.

The float is made of a buoyant material, hollow metal sphere or tube which is connected to the pointer by a linkage system so that vertical movement of the float is converted to instrument pointer movement.

### Ball Floats

The ball float is weighted so it will be approximately half submerged in the liquid. A typical installation of a flange mounted internal float having the float rod perpendicular to the mounting flanges is shown in Fig. 1a.

A level instrument with this type of float actuation is most frequently used as an indication of normal operating level in a vessel rather than for absolute values of level. For this reason the scale provided on the instrument is calibrated 10-0-10. The zero indicates normal operating level with high and low level on either side.

The range of level over which the instrument responds depends on the length of the float rod since its vertical travel about the center of rotation is fixed. This travel is from 15 to 25° above and below the horizontal center line depending on design. When mounted on the side of a vertical cylindrical vessel, the length of float rod and consequently the level range is limited by the diameter of the vessel.

The flanged opening on the side of the vessel must be large enough to permit the ball float to be inserted and the assembly mounted. The ball is usually 8 inches in diameter so an 8 or 10 inch flanged opening is required.

When it is necessary that the float operate near the wall of the vessel to prevent interference, another type of internal float assembly is available which has a shaft passing through a stuffing box perpendicular to the wall. (See Fig. 1b.) The float rod is fastened to the inner end of this shaft so the ball will travel in a plane parallel to the tank wall or mounting flange.

Only a small opening need be provided for either screw or flange mounted units. The vessel must be open or provided with a man hole to allow attachment of the float after the stuffing box is installed.

These units can be made very rugged to permit manual working of the float by means of a lever on the outside, should sticking occur on applications involving heavy viscous fluids.

For high and extremely low temperature service a long stuffing box with radiating fins should be used to keep the parking chamber at normal operating temperature.

For applications where there is severe turbulent action or foaming on the liquid surface or where there may be interference with internal piping and agitator blades, the internal float units mentioned above should not be used.

Float chambers are available for installation on the outside of the vessel containing the liquid (See Fig. 1c). A piping connection must be made to the top and bottom of the chamber thus permitting the liquid in the chamber to equalize with that in the vessel.

### Tubular Floats

The tubular float operates on the buoyancy principle rather than riding the surface of the liquid as the ball float mentioned above. The float is designed and weighted so it will sink in the heaviest liquid encountered. The instrument measures the weight of the float and as the liquid level changes, it responds to the change in buoyant force which is equal to the weight of liquid displaced by the float. In this sense the instrument does not directly measure surface position.

Since the buoyant force provided is linear with level changes, the instrument can have a uniformly graduated scale. For equal units of level change anywhere along the length of the float, there will be equal increments of instrument pointer movement. The scale can be calibrated in units of level above the lower end of the float or an arbitrary scale 10-0-10 as mentioned above may be used. The range of level which can be measured is limited only by the length of the float. (14 inches, to 12 feet or more).

The float is dimensioned and weighted to give correct readings of level at the normal operating specific gravity of the liquid. A correction factor must be applied to the scale readings when reading level of a liquid having a specific gravity other than that for which the float was designed.

Tubular float units may be mounted on the top of the tank as shown in Fig. 2. If the float cannot be mounted directly in the vessel due to mechanical interference or surface turbulance, it can be mounted outside the vessel in a chamber provided for this purpose. A typical installation is shown in Fig. 3. Both top and bottom of the float chamber must be connected to the vessel to insure that the level in the float chamber will be the same as that in the vessel.

If the contents of vessel must be heated to be kept

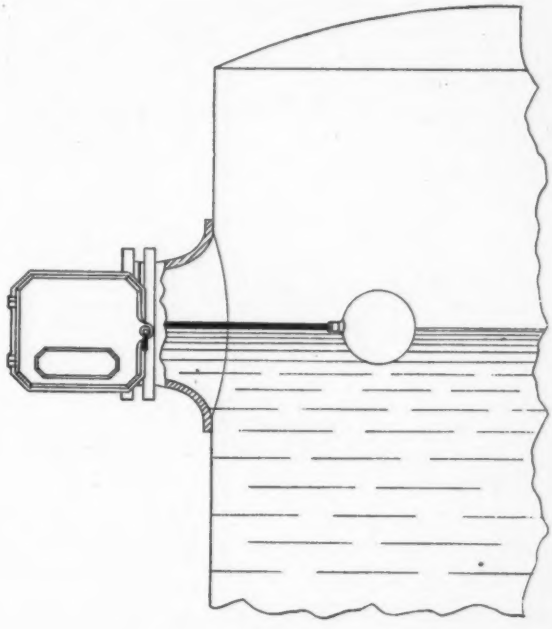

Fig. 1
**Typical Internal Ball Float Level Indicator Installation**

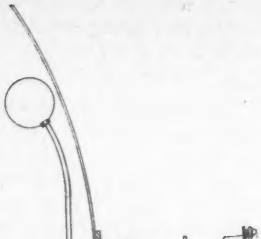

FIG. 1b
**Typical Internal Ball Float Level Indicator with Float Rod Parallel to Tank Wall**

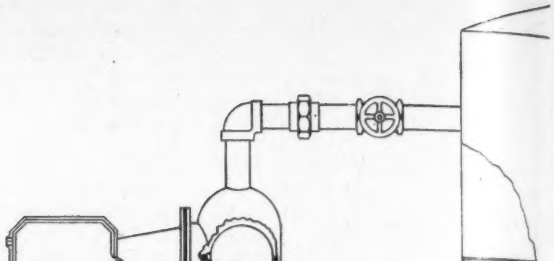

FIG. 1c
**Typical External Ball Float Level Indicator Installation**

in a liquid state, it will be necessary to encircle the float chamber and connecting piping with a steam heating coil to prevent sluggish operation or freeze up.

The instruments mentioned above may not be satisfactory for measuring extremely small level changes frequently required on some applications. A good example is the level in a paper coating machine.

If a level is to be measured or controlled within very close limits (a fraction of an inch to several inches), pneumatic motion transmitter or amplifiers which magnify the precise movement of a float on the liquid surface may be used.

An indirect method for measuring liquid level is to measure the hydrostatic pressure exerted by the liquid at the bottom of the tank, then by applying the proper multiplying factor to the pressure reading, the level is obtained.

The indicator scale is nearly always calibrated directly in units of length (feet, inches, etc.) rather than pressure.

Knowing the cross sectional area of the vessel for all levels, a scale can also be made to read directly in units of volume (bbl., gal., cu.ft. etc.)

### BOURDON TUBE

The simplest device for measuring hydrostatic pressure is the bourdon tube measuring element found in most pressure gages. A typical installation is shown in Fig. 4. The gage should be located near the bottom of the tank where it can measure as much of the total level in the tank as possible.

At the time of installation, the piping to the pressure gage should be completely filled with liquid so as to eliminate any error in pressure that may result from a vertical line partially filled with air. Horizontal runs of pipe should be sloped so the air can be vented at one point. Since the pressure measured by the gage is the same as that at point A in the tank, the gage will respond only to level changes above point A. Unless the gage is designed to indicate pressure below atmospheric, the gage will simply read zero for all levels below point A.

The following simple formula may be used in calculating liquid level from pressure gage readings or may be used in making a new scale which reads level directly:

$$L = 2.31 \frac{P}{G}$$

where
$L$ = level of liquid in feet above the gage.
$P$ = gage reading in pounds per square inch.
$G$ = specific gravity of liquid in tank.

Bourdon tubes are available, in brass, phosphor bronze, steel and stainless steel with ranges starting at 0 to 15 p.s.i. which is approximately 34.7 feet of water up to any pressure that would be encountered in a liquid level application.

The material selected should be one that will give long continuous service when in contact with the liquid.

### BELLOWS TYPE PRESSURE UNITS

For pressures below 15 p.s.i., bourdon tubes do not really provide sufficient energy for good control of the pointer position on an indicating or recording gage. A typical bellows type pressure unit having a range of 0 to 3 p.s.i. is shown in Fig. 5. Other higher ranges are available.

### MANOMETERS

If the maximum hydrostatic pressure is below 3 p.s.i. (approx. 7 feet of water), a mercury manometer (minimum range available 0 to 1 inch water) or bellows type manometer (minimum range available 0 to 20 inches water) may be used. The high pressure side of the manometer is connected to the bottom of the tank in place of the gage Fig. 4 and the low pressure side is left vented to the atmosphere when reading level in an open vessel.

Figure 6 illustrates a manometer installation on a

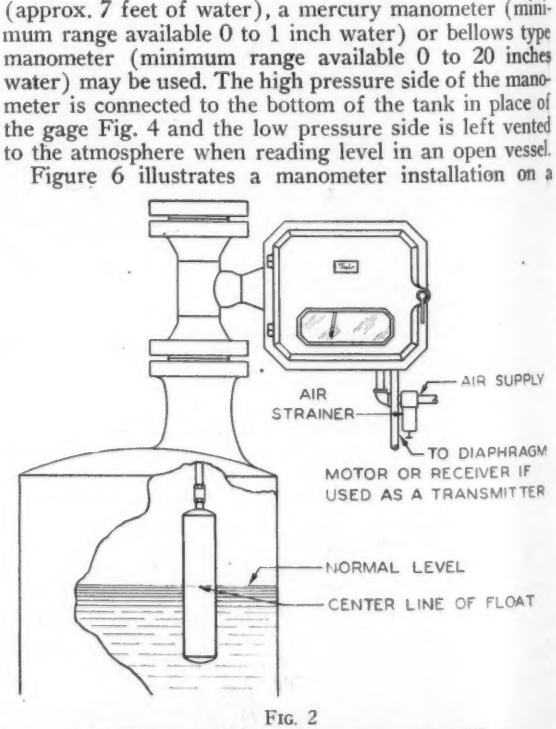


FIG. 2
**Typical Top of Tank Arterial Installation of Level-Buoy**

closed vessel. Note the low pressure side is connected to the top of the tank. This installation permits an accurate measurement of level for tank pressures other than atmospheric pressure. The high pressure side of the manometer is filled with liquid and the low pressure side is filled with vapor when it is noncondensable at room temperature. A drain is provided for any liquid that may collect in the manometer body or pressure tap. If the manometer is located above or below the lower tap, a manometer range correction is necessary to compensate for the pressure at zero level.

When measuring level in a closed vessel containing vapors that condense at room temperature, a condensate chamber should be installed in the upper tap. Since this line will always be filled with condensate, maximum differential pressure will be applied to the manometer when the level in the vessel is zero. For this reason the manometer is connected with the high side of the upper tap and the low side to the lower tap. Note that this is just the opposite to the installation mentioned above having a noncondensing vapor.

Figure 7 illustrates a method whereby liquid level can be measured under conditions of varying specific gravity. At the same time the system provides a measure of specific gravity. If the measured liquid is corrosive, a seal chamber is also used in the lowest tap.

The fixed tap distance $L$ is determined by the anticipated specific gravity range on the particular application. The upper manometer measures specific gravity, the lower manometer measures liquid level. The range of the lower manometer is determined by the maximum level changes to be encountered. The true liquid level is determined by correcting the liquid level reading with a factor derived from both liquid level and specific gravity readings.

## Liquid Seals

Physical and chemical properties of the liquid whose level is being measured do not always permit making an installation where the liquid will be in contact with the measuring unit. The liquid may corrode the internal working parts of pressure unit, thus making the instrument nonresponsive to pressure variation caused by changes in level.

The instrument can be protected from corrosive materials by using a liquid seal. The sealing liquid is placed in the manometer or other pressure measuring unit and in a sealing chamber provided for this purpose. A typical installation using a sealing liquid heavier than that in the tank is shown in Fig. 8.

Properties of Sealing Liquid:

1. Specific gravity must be different from that of the liquid whose level is being measured.
2. Must not be harmful to measuring element.
3. Must not clog the lines.
4. Must not mix or dissolve in the tank liquid.
5. Should not form contamination if a quantity works its way over into the tank.

Some commonly used sealing liquids are: water, oil, mercury, carbontetrachloride, 50% glycerine and water, 50% Prestone and water.

There are two reasons for having sealing chambers: First, the seal chamber provides a positive interface position beyond which the harmful or corrosive material will not go.

Secondly, it acts as a reservoir for volume changes in the instrument when pressure changes occur. The second reason is particularly important on liquid level measuring application because pressure at the measuring element is produced by a column of sealing liquid plus a column of process liquid. When the instrument responds to a change in liquid level, its internal volume changes and an equal volume of sealing liquid must flow in or out of the instrument depending on the direction of level change. If this flow of sealing liquid raises or lowers the interface position, an error in level will result because the column lengths of sealing liquid and process liquid are now different from what they were when the instrument was zero set. To minimize this effect the cross sectional area of the sealing chamber should be large at the position of the interface.

The required seal chamber area may be determined as follows:

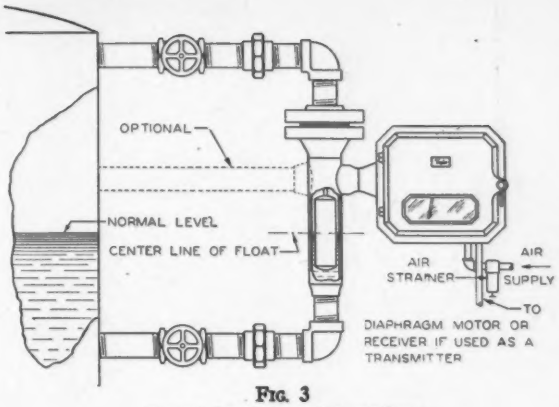


FIG. 3
**Typical Installation of Level-Buoy**

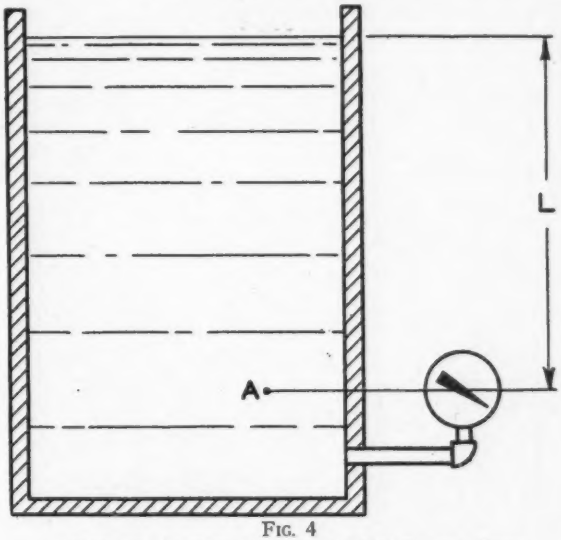


FIG. 4
**Method for Measuring Liquid-Level Using Pressure Gauge**

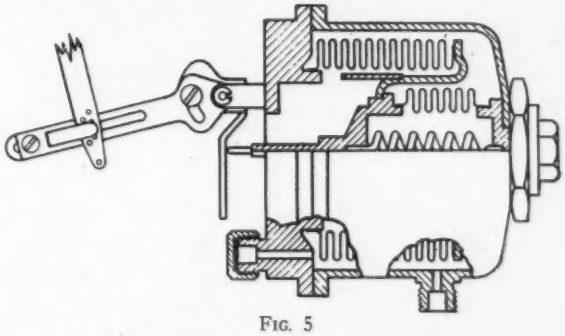

FIG. 5
**Liquid Level Measurement with Vapor Filled Upper Tap**

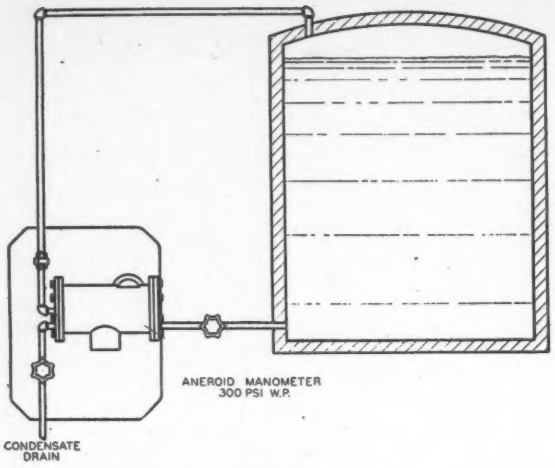


FIG. 6
**Liquid Level Measurement with Vapor Filled Upper Tap**

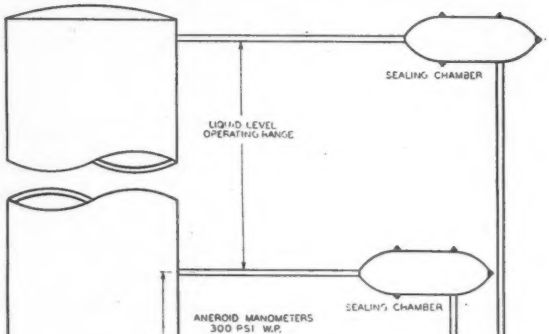


FIG. 7
**Liquid Level Measurement with Varying Specific Gravities**

Pressure gage or manometer with only one sealing chamber:

$$A = \frac{V}{eh}\ (G_s - G_l)$$

Where:

$A$ = cross-sectional area of seal chamber in square inches at the interface position.
$V$ = displacement volume of meter in cubic inches for full range.
$h$ = range of instrument in inches of water.
$e$ = per cent of error expected.

For a manometer using two sealing chambers, one on each side:

$$A = \frac{2V}{eh}\ (G_s - G_l)$$

REQUIREMENTS OF SEALING CHAMBERS:

1. Must be made of material which will not be corroded by either process or sealing liquid.
2. Must provide large enough crossectional area at interface position to minimize errors.
3. Must provide large enough volume so as not to require too frequent cleaning or replacement of sealing liquid.
4. Must provide conveniently located holes for filling draining, and connecting the pressure taps.

One make of seal chamber constructed of cast steel shown in Fig. 8, is 14 inches long by 4½ inches in diameter. A satisfactory one can be made from a section of 4 inch pipe 1 foot long and capped at both ends. Special sealing chambers can usually be constructed to take care of existing conditions.

The density of the sealing liquid effects the zero setting of a manometer (See Fig. 8).

When the level of liquid is at the lower tap, the differential pressure at the manometer is equal to the difference in height between the two seal chambers times the specific gravity of the sealing liquid. When the level is even with the upper tap, the differential pressure at the manometer is not zero, due to the difference in density between the sealing liquid and the liquid in the vessel.

$$S = L\ (G_s - G_l)$$

Where:

$S$ = differential pressure in inches of water when the tank is full. (Called suppression.)
$L$ = distance between taps in inches.
$G_s$ = specific gravity of sealing liquid.
$G_l$ = specific gravity of liquid in vessel at operating temperature.

PURGES

A liquid seal is not satisfactory protection against material that will clog the lines between the sealing chambers and the vessel. This is particularly true for liquids containing solids in suspension or liquids which coagulate or precipitate when held stagnant in the pressure line.

A time proven method for overcoming this difficulty is to introduce a purge fluid (gas or liquid) in the connecting line between the instrument and the pressure tap. The purge flow is always in toward the tank so that suspended solids and liquids which would otherwise clog the line are continuously washed into the tank.

There is always a pressure drop associated with the flow of fluid in a pipe. This pressure drop will effect the level measuring instrument since it is pressure actuated. The error can be minimized by keeping the purge rate as low as possible. For example a good rate is one having a velocity of 1 inch per second for liquids or gases. The error can also be minimized by introducing the purge fluid in the pressure line very near to the pressure tap on the vessel. Pressure drop due to purge flow is then limited to the short length of pipe between the point of admission and the vessel. This method has its disadvantages in that two lines are required, one for purge and the other for measuring in which there is no flow.

If it is not convenient to install two lines, the error introduced by purge flow in the measuring line can be held at a constant value by carefully maintaining a constant purge rate. When using a manometer for measuring liquid level, the effect of purge flow will cancel if the purge rates in both the high and low pressure lines are equal. This is true if both lines are nearly the same length.

Requirements of a good purge:

1. Not harmful to instrument.
2. Must not form harmful contamination in the vessel.
3. There must be a good dependable supply.
4. Inexpensive since it must flow continuously.

GAS PURGES AND THE BUBBLE PIPE

A gas purge is used where ever possible because it is so simple to apply and does not present some of the problems encountered in liquid seals and liquid purges. (See Figs. 9, 10, 11 and 12). Compressed air is readily available in most plants and is by far the most common

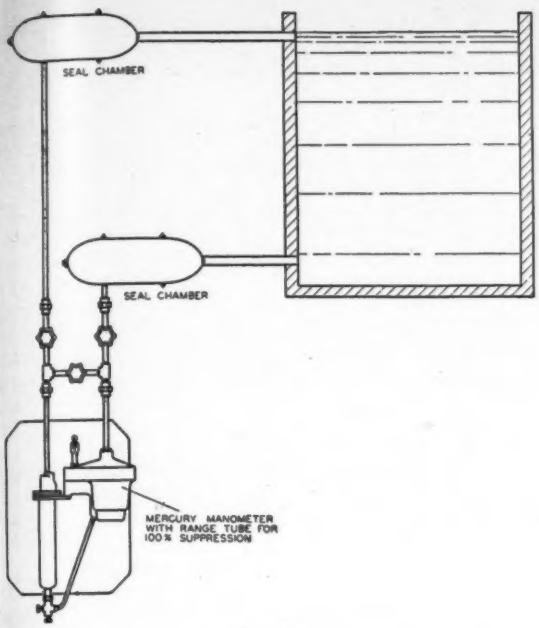


FIG. 8
**Liquid Level Measurement Using Mercury Manometer with 100% Suppression**

purge used. Nitrogen, carbon dioxide, and other gases are also used depending on the particular requirements. The density of gases is very low in comparison with liquids, consequently no correction is necessary for elevation between the instrument and the point of pressure measurement.

The most common application of an air purge is on a bubble pipe shown in Fig. 13. The bubble pipe should be mounted vertically with the lower end a short distance above the bottom of the vessel and extending above the top of the vessel. In case of a purge supply failure, only the large bubble pipe will be filled with liquid and none will get into the pressure line. The bubble pipe should be large in diameter for liquids that have a tendency to stick to the walls. Note that the purge line and pressure tap are made as close to the top of the bubble pipe as possible to minimize errors which may be caused by pressure drop due to purge flow.

When measuring level with a sensitive pressure instrument having a small range, the formation and breaking away of bubbles at the end of the bubble pipe may cause the indicator to fluctuate. This can be eliminated by inserting a pulsation damping unit or needle valve in the pressure line to the instrument. This effect can be minimized to a certain extent by cutting several V-notches in the lower end of the bubble pipe so small bubbles will be formed.

The flow of purge gas may be adjusted by means of a needle valve in the supply line. A rotameter or sight feed bubbler serves to indicate the rate of flow. Many problems in maintaining a constant purge can be eliminated by the system shown in Fig. 12. The small port opening in a needle valve can very easily be plugged with dirt from the supply. Changes in process or supply pressure also cause the purge rate to vary. The differential pressure controller in Fig. 12 maintains a constant low pressure drop across the needle valve which acts as an adjustable orifice to change the purge rate. For a given rate of purge the needle valve port has a larger opening than it would have if a low differential across it were

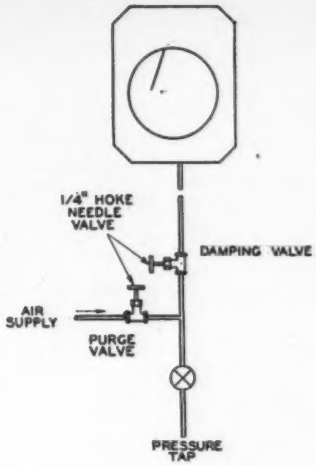


FIG. 9
**Purge System with Hoke Needle Valve**

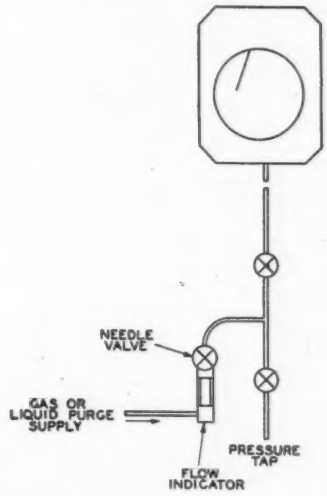
NEEDLE VALVE
GAS OR LIQUID PURGE SUPPLY
PRESSURE TAP
FLOW INDICATOR
NOTE - SELECT PROPER FLOW INDICATOR DEPENDING ON WHETHER PURGE IS LIQUID OR GAS

FIG. 10
**Purge System with Rotameter and Needle Valve**

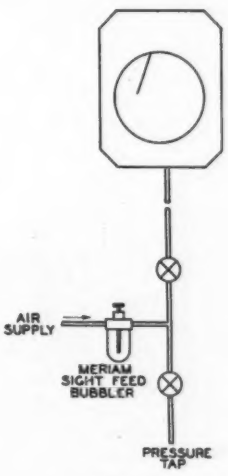


FIG. 11
**Purge System with Meriam Sight-Feed Bubbler**

not maintained; consequently, it has less tendency to become plugged.

### Liquid Purges

Gas purges are not too satisfactory for measuring the level of certain viscous concentrated liquids and liquids containing suspended solids. Every time a bubble of air escapes from the pressure tap or bubble pipe, a small amount of liquid or pulp is pulled into the tap before the next bubble comes out. The dry purge gas tends to dry the pulp or crystalize salts from the concentrated liquids which build up inside the tap until the flow of purge gas is seriously restricted or stopped.

This difficulty can be overcome by purging with a liquid which will continuously wash the inside of the line to keep it clean. Water is by far the most common purge liquid used. Other liquids are used depending on particular requirements.

Liquids being more viscous than gases will produce a greater pressure drop in a line for a given flow. Consequently, it is very important that the hydrostatic pressure measured by the level instrument be not affected by the pressure drop due to purge flow. All precautions applying to the use of gas purge systems also apply to liquid purges except that much larger pressure drops are obtained in pressure lines with the flow of a liquid purge.

Liquid purges are sometimes used intermittently as for example, on the pressure and liquid level taps of a digester. There may be little danger of the taps plugging in a short period of time therefore the purge flow is shut off during the operating cycle. In between cycles the purge is turned on for a short time to flush out the lines.

Additional protection is sometimes provided by using liquid purges (continuous or intermittent) in connection with liquid seals. In spite of the many precautions to maintain a constant purge, the supply may fail and before this failure is detected and corrected, the corrosive liquid may work its way into the pressure line. Even though the piping and sealing chambers are corroded and possibly plugged, the measuring device is still protected by the sealing liquid. The cost of putting the system back in operation will not be as great as it would be if instrument repairs or replacement were necessary.

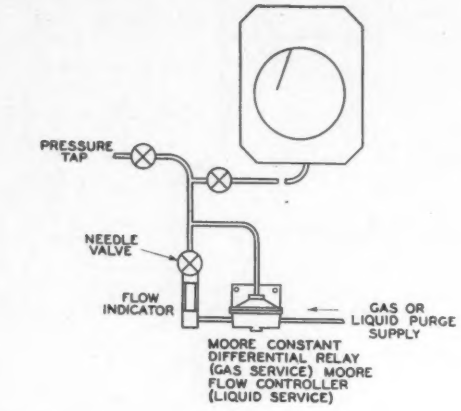
PRESSURE TAP
NEEDLE VALVE
FLOW INDICATOR
GAS OR LIQUID PURGE SUPPLY
MOORE CONSTANT DIFFERENTIAL RELAY (GAS SERVICE) MOORE FLOW CONTROLLER (LIQUID SERVICE)
NOTE- SELECT PROPER FLOW INDICATOR DEPENDING ON WHETHER PURGE IS LIQUID OR GAS

Fig. 12
**Purge System with Moore Flow Controller**

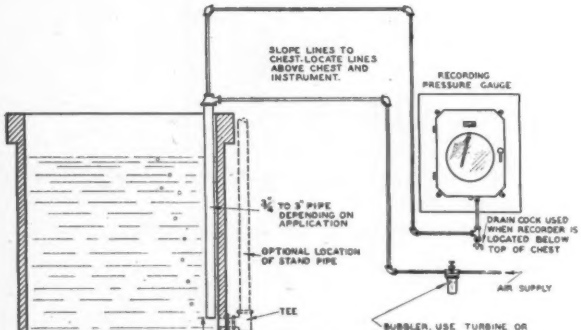
SLOPE LINES TO CHEST: LOCATE LINES ABOVE CHEST AND INSTRUMENT.
RECORDING PRESSURE GAUGE
¾ TO 5" PIPE DEPENDING ON APPLICATION
OPTIONAL LOCATION OF STAND PIPE
DRAIN COCK USED WHEN RECORDER IS LOCATED BELOW TOP OF CHEST
AIR SUPPLY
TEE
DRAIN PLUG
FLANGE
BUBBLER. USE TURBINE OR LIGHT MINERAL OIL IN BUBBLER
BOTTOM OF PIPE TO BE 6" ABOVE BOTTOM OF CHEST

Fig. 13
**Liquid Level Recorder for Stock and Water Chest**

### Diaphragm Type Pressure Transmitter

From the fore-going discussion it is evident that seals and purges used to protect the liquid level measuring instrument, introduce other factors which effect accuracy and performance. They constitute additional pieces of equipment which must be cared for to insure satisfactory continuous performance.

The instrument shown in Fig. 14 is a pressure transmitter and provides a simple means for measuring pressure not requiring the use of seals and purges.

It separates the liquid in the tank from the mechanism by a flexible metal diaphragm. This pressure transmitter which operates on a force balance principle is flange mounted to the bottom or side of the vessel.

The liquid inside the vessel is in contact with only the flexible diaphragm and retaining flange. As the liquid exerts pressure due to hydrostatic head on the

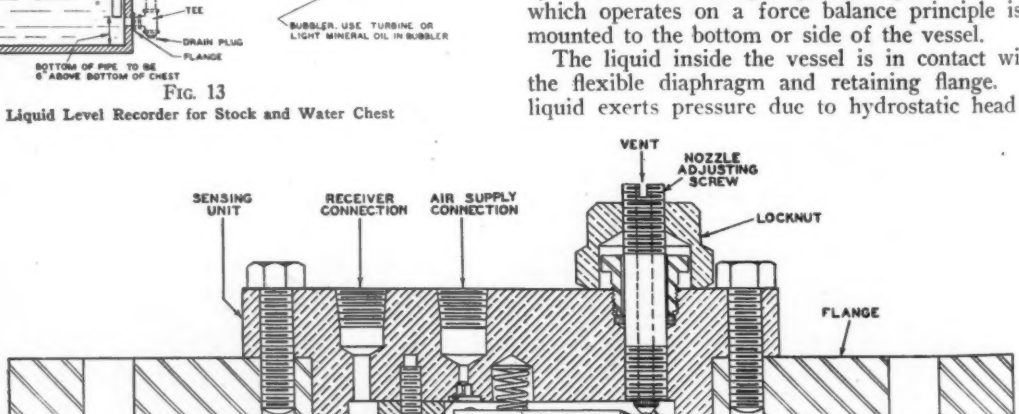


Fig. 14
**Taylor 229 RF Transmitter Schematic Cross Section**

diaphragm, it makes the baffle seal off the bleed nozzle. The air supply enters the unit through a small orifice and builds up a pressure against the inside of the diaphragm. When the air pressure is just equal to the pressure exerted by the liquid on the outside of the diaphragm, the baffle throttles the bleeding of air out through the nozzle to the atmosphere at the same rate that it enters through the orifice. A connection is provided for a remotely located indicating or recording receiver which is actuated by a bourdon coil, bellows or mercury manometer. The pressure range of the receiver must be the same as the pressure applied to the transmitter by the liquid. In the typical installation of Fig. 15 the maximum pressure applied to the transmitter by the liquid is 7.9 p.s.i. (14 ft. × 1.3 sq. gr. × 0.4335 p.s.i. per ft. of water = 7.9 p.s.i.). This requires a 10 p.s.i. hydron bellows element calibrated 0 to 7.9 p.s.i. for 0 to 14 feet of liquid.

If the level in a closed vessel is to be measured, a manometer must be used so that tank pressure will not effect the level readings. Figure 16 shows how an installation can be made using the pressure transmitter described above.

### Determine Level by Weighing Vessel

Another method for measuring liquid level which is used occasionally is to measure the gross weight of the vessel and contents. Knowing the weight of the vessel, the net weight can be determined, and the level calculated.

The vessel must rest on the platform of a scale or on a load measuring element as shown in Fig. 17. Any guides required to keep the tank in position must be arranged so as not to produce a force that will cause an error in measurement. Piping to and from the vessel should be flexible or if possible not rigidly connected. The scales or load measuring element can be adjusted to read zero when supporting only the empty vessel.

A conversion chart is used for determining liquid level from weight.

### Conclusion

When one is confronted with a liquid level problem, always select the measuring method which is the simplest and most direct and which will give satisfactory continuous performance.

Try to use an instrument constructed of material that will not require protection by seals or purges.

If protection is required, use seals because they require less attention.

If seals are not satisfactory use the next best thing, a gas purge and if this is unsatisfactory, investigate the possibilities of a liquid purge system, or install the force balance type of liquid level transmitter.

If all these methods fail, one may still be able to weigh the vessel.

### Discussion

In the discussion which followed, several interesting applications were mentioned. One in particular is the use of a temperature sensitive instrument for measuring liquid level. This is used extensively for measuring and controlling the level in the disk evaporator used in concentrating black liquor.

The temperature sensitive bulb is located at the desired level. When the level is low the bulb cools to the temperature of the air above the liquid. The "ON-OFF" Controller then opens the supply valve. When the level rises to the bulb it senses the change in temperature and closes the supply valve. In order to make an installation of this type work successfully, there must be a difference in temperature between the liquid and the

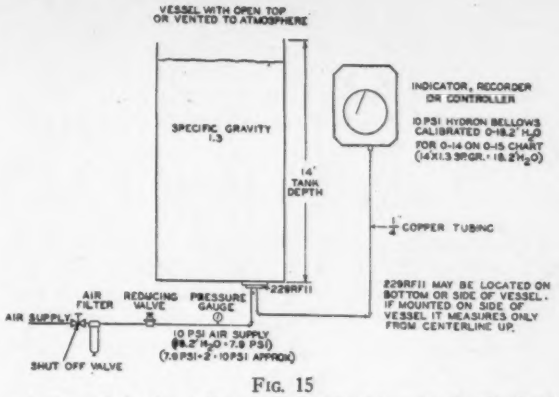
VESSEL WITH OPEN TOP OR VENTED TO ATMOSPHERE
SPECIFIC GRAVITY 1.3
14' TANK DEPTH
INDICATOR, RECORDER OR CONTROLLER
10 PSI HYDRON BELLOWS CALIBRATED 0-18.2' $H_2O$ FOR 0-14 ON 0-15 CHART (14X1.3 SP.GR. = 18.2' $H_2O$)
1/4" COPPER TUBING
229RF11
229RF11 MAY BE LOCATED ON BOTTOM OR SIDE OF VESSEL. IF MOUNTED ON SIDE OF VESSEL IT MEASURES ONLY FROM CENTERLINE UP.
AIR SUPPLY
AIR FILTER
REDUCING VALVE
PRESSURE GAUGE
10 PSI AIR SUPPLY
SHUT OFF VALVE

FIG. 15

**Typical Installation Level Measurement of Emulsion with Specific Gravity of 1.3 in Tank 14 Feet Deep**

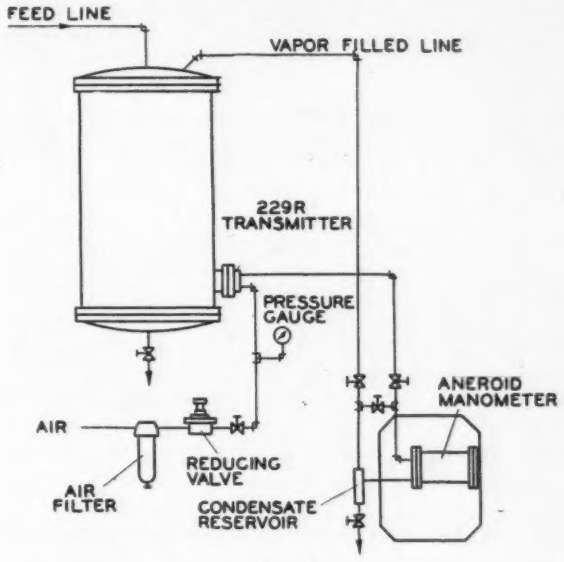


FIG. 16

**Method of Measuring Liquid Level Using a Transmitter**

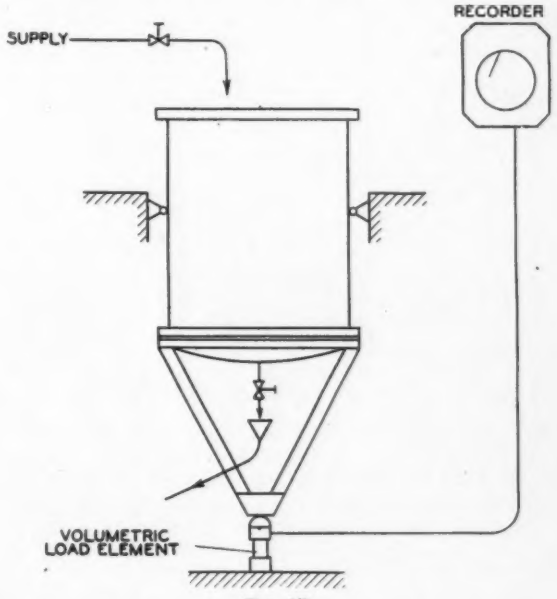


FIG. 17

**Method of Measuring Liquid Level by Weighing Tank**

air above it. This same idea is used for controlling the level of a vapor in a tower. Another interesting measurement is the interface position between two liquids in the same vessel having different specific gravities. Either the ball or tubular float actuated instrument may be used. In order to make the float mid-position occur at the interface the weight of the float must be equal to the weight of heavy liquid displaced by the lower half of the float plus the weight of light liquid displaced by the upper half of the float.

# Lake States TAPPI Discusses Valves

The TAPPI Lake States Section meeting was held at the American Legion Club House, Appleton, Wis., at 6:30 p. m. on November 9, 1948. Sixty nine Section members and guests attended.

At the conclusion of dinner the meeting was called to order by the Section chairman, A. M. Heald. He introduced as the speaker of the evening William Heilig, Vice President and Chief Metallurgist of the William Powell Co., Cincinnati, Ohio. Mr. Heilig gave an excellent discussion on the subject "The application of Valves to the Pulp and Paper Industry." This was divided into three parts:

1. The first part of the talk was devoted to a general discussion of the various types of gate and glove valves used in the industry, with particular emphasis on recent advancement in design and construction.

2. The second part was a discussion of a number of severe corrosion problems on valves, which were submited by local mills. Valve types and materials for these conditions were suggested.

3. A very active session of questions from the floor followed, which Mr. Heilig answered by drawing on his extensive experience in the field and citing specific parallel cases where these particular problems had been solved.

The December meeting will be held at the Legion Club House, Appleton, on December 14, 1948. Dinner will be served at 6:30 p. m. following which Dr. Harry F. Lewis, Dean of the Institute of Paper Chemistry, will act as chairman for a discussion of "Agricultural Fibers." Other members of the Institute Staff will participate in the presentation of this subject.

Those present included Merrill Aderman, F. L. Aldrich, Arden M. Anderson, Forrest Anderson, William V. Arvold, John Bard, Arnold G. Beaman, A. P. Bellinghausen, A. M. Billings, C. W. Berger, Frank E. Boli, George J. Brabender, Russell Brenzel, M. A. Buchanan, Bennie Burish, T. C. Catlin, Frank J. Chadwick, Milo M. Cotts, Eugene J. Crotteau, Warren DeVoe, H. P. Dixson, R. M. Elias, Edwin F. Fischer, L. V. Forman, L. A. Gilbertson, Mike Goehler, J. H. Graff, Ejnar Gisselman, Henry Grabowski, J. W. Grimes, Don Hagerla, John A. Handeyside, John A. Hanson, Paul B. Hansen, John M. Hayes, William Heilig, A. M. Heald, T. A. Howells, Russell V. Knapp, Otto Kuemmerling, R. D. Kolasinski, Jos. Kryszak, Howard J. Kuntz, R. B. Lundy, S. R. MacSwain, John M. Marshall, W. W. Marteny, George E. Martin, H. P. Molter, Cole H. Morrow, D. E. Pedginse, David F. Petersen, A. Phillips, Robert D. Rae, C. F. Reinhardt, O. H. Ross, H. A. Schauer, Milton A. Schreiner, E. H. Shriver, L. E. Simerl, Clyde W. Steele, Robert E. Strauss, Frank Swedish, H. L. Voss, Edward H. Weil, Jos. K. Welch, H. L. Wendshuh, Phil Zilles.

# New England Section TAPPI Meeting

The opening meeting of the New England Section of TAPPI held at the Red Lion Inn, Stockbridge, Mass., Oct. 8, 1948, was attended by 100 members and guests. Papers given were as follows:

1. "A Positive Solution to the Present Critical Unreliable Rag Papermaking Fiber Situation" by Mr. Earl Brennan of the Railway Supply & Mfg., Co., Cincinnati, Ohio.
2. "Present Rag Situation—Committee Report on Foreign Troublesome Fibers and Finishes in Textile Waste Used in Rag Paper Manufacture" by Charles K. P. Geohegan, Vice-President and Technical Director of Aetna Paper Co., Dayton, Ohio.
3. "The National Program For Stream Improvement, —Present Status Of Its Need, Enforcement, Benefits, Etc., as Related to 'The Berkshires' Paper Mfg. Group (Or New England)" by Mr. Russell L. Winget, Exec. Secretary of The National Council for Stream Improvement, New York, N. Y.

Attending the meeting were:

E. W. Strecker, C. H. Child, Robert Pattison, Leonard Taylor, John O'Leary, T. J. Morrison, Jr., M. Barowsky, F. C. Glackner, C. L. Reece, Wm. Whiting, G. Kittredge, H. Smith, G. Cushine, W. Hoxie, C. Bauers, B. Sullivan, F. Williams, J. F. Wright, J. B Gabler, Wm T. Kirby, J. L. Coburn, Dr. Jessie Minor, W. H. Eastburn, R. I. Mason, Miss Helen Kiely, Albert F. Scott, David Elmore, Mr. Duffy, Mr. Young, H. J. Lawler, Orland Blanchard, Gerald Rood, Eng. F. T. Krichels, F. S Klein, Joseph LaMountain, J. P. Bainbridge, Jr., E. M. Brennan, Geo. Callahan, V. Striebel, Edward F. Crew, Kenneth Geohegan, W. LaDuke, C. C. Decker, A. G. Dreis, O. F. Hutchinson, Wm. Nye, L. B. Tucker, Val Gooding, E. A. Sitzer, C. I. Horton, N. J. Cowie, Wm. Daverin, R. E. Kilty, R. A. Sherman, M. E. Blew, Mr. and Mrs. J. G. Bullard, Mr. and Mrs. P. S. Bolton, Mr. and Mrs. W. E. Wentworth, F. C. Holmes, C. J. Pennings, Victor L. Blenke, Bruce Andrews, W. D. Stroud, Paul Peiffer, Mr. and Mrs. Arthur Stone, Mr. and Mrs. Norman Alper, W. J. Zubrisby, Francis J. Hogan, M. Crowell, Fred Bradley, R. L. Stephens, F. R. Desmond, A. M. Worthington, Jr., Alfred J. DeCouagne, C. R. O'Neill, G. R. Donelson, W. Wildman, Randall Baker, A. Crane, J. L. Bagg, Alfred Montagna, B. E. Teale, E. A. Richardson, Geo. McTeague, L. Farrington, Louis Henry, F. Powers, R. H. Doughty, F. L. Simons, S. J. Quattrocchi, Herbert Leonard, Fred Bolner, Thomas C. Catlin, C. F. Young, A. P. Knaus, T. E. Chalmers, W. Hallidan, R. J. Proctor, Dr. Werner Kaufmann, W. Newland.

The November meeting will be a joint meeting with the New England Section of the American Society for Testing Materials to be held at the Sheraton Hotel, Worcester, Mass., November 19.

The speakers will be Wm. R. Willets and Dr. Lewis S. Reid on "The Philosophy of Specifications" and Dr. George P. Wadsworth on "Practical Quality Control."